

III. THE GERRINÆ OF THE WESTERN HEMISPHERE (HEMIPTERA).

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Water-striders form an interesting and picturesque part of aquatic life. Much attention and speculation is often aroused by the free and easy manner in which these insects live upon the surface of the water. At times they may be seen standing or resting idly, frequently drifting with the currents or under the influence of the wind. At other times they may be seen playfully jumping and skating or coursing here, there, and everywhere in search of food. When disturbed, these creatures suddenly and violently dart away from the shore by means of their long legs.

The subfamily Gerrinæ includes the largest of the American water-striders.* They are confined entirely to inland waters, and prefer the slow-moving and quiet parts of streams and sheltered places in secluded coves of ponds and lakes. In habits the species are gregarious, but they do not live in such close and compact schools as do some of the halobatoids and especially Rhagovelia-species of the family Veliidæ. For food water-striders prey largely upon other insects, frequently feeding upon forms which have by ill-luck, chance or otherwise fallen into the water and are more or less helpless. In the case of a shortage of suitable food most forms exhibit cannibalistic tendencies, the young nymphs and weaker adults often falling as victims of prey to stronger members of the same school or aggregation.

The present paper includes a brief review of family and subfamily characters, a tabular diagnosis of genera, analytic tables for the separation of species, and discriminative and distributional notes on the members of the subfamily Gerrinæ occurring in North, South and Insular America. Citations under the genera and species include references to the original descriptions, and to some of the more important nomenclatorial changes and works on biology and geographic distribution. As regards the arrangement of genera and the segregation of species an attempt has been made to indicate their natural relationship.

*Known also by the appellations water-spiders, pond-skaters, wherry-men and the like.

The thorax often shows marked differences within a species, depending on the sex and the degree of development of the wings. Because of this, efforts have been made to arrange the keys so that they apply equally well to apterous, brachypterous, and macropterous forms. Likewise the diagnostic tables will serve in identifying specimens of either sex, except in the case of that given for *Gerris* (Fabr.). In this latter genus there are groups of species in which the visible external specific differences between female specimens are so slight that they do not readily lend themselves to use in diagnostic keys, and hence the key given applies only to male individuals. For the segregation of female specimens within this genus it will be necessary to refer to the notes given in the descriptions.

Representatives of all the species discussed herein have been examined, save four species of *Potamobates*. For convenience the species have been numbered consecutively. The measurements of the antennal segments may be converted into millimeters by multiplying by .212 (1 mm. = approximately 47 divisions).

Family GERRIDÆ Amyot and Serville, 1843.

Head horizontal, shorter than pro- and mesonota united, somewhat declivent in front of eyes. Antennæ inserted in front of eyes, filiform, 4-segmented, the ring-like segment between two and three being considered as a part of the third. Rostrum short or long, 4-segmented. Body beneath densely clothed with short, appressed pile. Abdominal spiracles normal. Metasternal orifice (omphalium) median, often more or less prominent. Claws ante-apical, inserted in a cleft a little before apex of last tarsal segment. Anterior legs comparatively short, raptorial, the femora more or less incrassate. Intermediate and hind legs very long, slender. Fore coxæ considerably removed from middle pair, the middle and hind pairs placed close together.

The family Gerridæ is universally distributed. It is represented in the Western Hemisphere by two subfamilies, namely, (1) *Gerrinæ* Bianchi (1896) and (2) *Halobatinæ* Bianchi (1896). The subfamily *Ptilomerinæ* Esaki (1927) is confined to central and southeastern Asia and nearby islands. The subfamilies occurring in the Western Hemisphere may be differentiated thus:

Inner margin of the eyes arcuately emarginate behind the middle; body elongate, the abdomen usually long (short in a few species).

Subfamily *Gerrinæ* Bianchi.

Inner margin of the eyes convexly rounded; body short, the abdomen usually nymphal-like in appearance. Subfamily *Halobatinæ* Bianchi.

SUBFAMILY GERRINÆ Bianchi, 1896.

Small or large, usually long, sides subparallel. General color brown to black, frequently marked with brilliant silvery pubescence. Thorax modified or changed according to degree of wing-development within a species (apterous, brachypterous or macropterous). Abdomen composed of 6 visible segments (in reality 7 as the first is not discernible beneath) and two genital segments. Pterygomorphism peculiar to many species. In alate forms hemelytra somewhat coriaceous, the nervures strongly developed and prominent.

This subfamily is represented in the Western Hemisphere by five genera and fifty-five species and varieties, eleven of which are described below as new to science. *Potamobates* of Champion is the only genus restricted to the Americas.

Through the kindness of numerous friends and co-workers the writers have received many specimens of water-striders for examination and study. Thanks are especially due Dr. Hugo Kahl, Carnegie Museum; Mr. W. E. China, British Museum; Dr. H. B. Hungerford, University of Kansas; Mr. H. G. Barber, National Museum; Dr. Max Beier, Vienna Museum; Dr. Nathan Banks, Harvard University; Dr. J. C. Bradley, Cornell University; Dr. W. Rammé, Berlin. The illustrations were made by Mr. A. R. Janson and Mrs. B. V. Travis. In the descriptions and keys the writers have drawn freely upon published notes and records. The literature pertaining to several species belonging to the genera *Gerris* Fabr. and *Limnogonus* Stål is greatly involved. For many years several distinct forms were confused with some of the commoner species such as *G. marginatus* Say, *G. conformis* (Uhler), *L. hyalinus* (Fabr.), and *L. guerini* (L. & S.) and therefore often erroneously recorded in the published literature. Until quite recently two species, *G. dissortis* D. & H. and *G. notabilis* D. & H., have been confounded with the European *G. rufoscutellatus* Latr., which is not known to occur here in America.

KEY TO THE GENERA OF SUBFAMILY GERRINÆ.

- I. Eyes exerted. Rostrum reaching upon anterior portion of mesosternum. Metasternum entire.....II
 Eyes not exerted. Rostrum short, not reaching base of prosternum. Metasternum divided by a transverse suture so as to appear bi-segmented..IV
- II. Body dull. Tarsal segments of fore leg subequal in length.....III
 Body shiny. First tarsal segment of fore leg short, much shorter than second.....Genus *Limnogonus* Stål, p. 202

III. Antennæ moderately long, scarcely reaching beyond hind margin of thorax.

Genus *Gerris* Fabr., p. 182

Antennæ elongate, slenderer, practically as long as the entire body.

Genus *Tenagogonus* Stål, p. 215

IV. Very elongate, cylindrical. Middle and hind femora extending only a little beyond tip of abdomen. Male genital segments symmetrical.

Genus *Cylindrostethus* Fieb., p. 218

Body of various shapes, usually slightly flattened. Abdomen shorter, hind and middle femora extending at least one-half of their respective lengths beyond apex of abdomen. Male (and in some species female) genital segments asymmetrical. Genus *Potamobates* Champ., p. 223

I. Genus GERRIS Fabricius, 1794

Logotype, *lacustris* (Linnæus)

Gerris Fabricius, Ent. Syst., IV, 1794, p. 187; Latreille, Consid. Genl., 1810, pp. 259, 434 (names *lacustris* type); Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 144; Bergroth, Ent. Mo. Mag., (2) XIII, 1902, p. 258-260; Distant, Fauna Brit. India, Rhyn., II, 1904, p. 176; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 208; Torre-Bueno, Trans. Amer. Ent. Soc., XXXVII 1911, p. 244; Van Duzee, Cat. Hemip., 1917, p. 426; Hungerford, Bull. Univ. Kansas, XXI, 1919, p. 108.

Aquarius Schellenberg, Geschl. Land-und Wass. Wanz., 1800, p. 25.

Hydrometra Lamarck, Syst. Anim. s. Vert., 1801, p. 295 (in part); Fabricius, Syst.

Rhyng., 1803, p. 256; Mayr, Reise Freg. Novara, Zool. II, Hemip., 1868, p. 169.

Hygrotrechus Stål, Öfv. Vet. Akad. Förh., XXV, 1868, p. 395; Uhler, Stand. Nat. Hist., II, 1884, p. 267.

Limnoporus Stål, Öfv. Vet. Akad. Förh., XXVII, 1868, pp. 395, 396; Bergroth, Proc. U. S. Nat. Mus., LI, 1916, p. 237.

Limonotrechus Stål, Öfv. Vet. Akad. Förh., XXVII, 1868, p. 395.

Head short; eyes large, prominent, exerted. Antennæ moderately slender, usually reaching hind margin of pronotum. Rostrum moderately short, reaching to or a little beyond the pro-mesosternal suture. Body subparallel, clothed with short, golden hairs.

In the apterous form the pronotum usually long, its hind lobe often covering a considerable part or even all of mesonotum, or sometimes short and not produced behind. Hemelytra, when present, dark, the nervures raised and prominent. Legs variable in length in different species, sometimes extremely long; middle and posterior femora and tibiæ long; fore tarsal segments subequal in length. Body beneath covered with dense pile. Male genital segments symmetrical.

The genus *Gerris* is universally distributed, occurring on every continent. Twenty-eight species and varieties are recognized from Continental and Insular America, three of which are described below

as new to science. Since *Gerris summatis*, sp. nov. is known only from female specimens it is not included in the key. Pterygopolymorphism is common, many species being represented by macropterous, brachypterous and apterous individuals. The non-shiny superior surface of head and thorax and the short golden pubescence upon upper surface of body and on nervures of hemelytra serve to separate *Gerris* from *Limnogonus*.

KEY TO SPECIES OF *Gerris* (MALES)

1. Venter simply emarginate at apex (Pl. XXIII, figs. *a, d, e, f, g*). Connexival spines very long, reaching to or slightly beyond the middle of the last genital segment (except in *chilensis* Berg).....2
 Venter doubly emarginate behind, the second emargination forming a more or less distinct notch at the middle (Pl. XXII; Pl. XXIII, figs. *b, c*; Pl. XXIV, figs. *b, c*). Connexival spines much shorter or wanting.....8
2. Venter deeply angularly excavated behind, somewhat V-shaped (Pl. XXIII, fig. *g*).....*uhleri* D. & H., p. 186
 Venter deeply roundly emarginate behind, broadly U-shaped.....3
3. Connexival spines very short, inconspicuous.....*chilensis* (Berg), p. 187
 Connexival spines quite long, prominent.....4
4. First antennal segment subequal to or distinctly longer than II and III conjoined. Color very dark.....5
 First antennal segment shorter than II and III conjoined. Body reddish brown or marked with reddish brown.....6
5. First antennal segment longer than II and III conjoined. Last segment of venter without distinct median depression (Pl. XXIII, fig. *a*).
conformis (Uhler), p. 185
 First antennal subequal to II and III conjoined. Last segment of venter with a prominent, deep, broad, depressed median furrow (Pl. XXIII, fig. *e*).
nebularis D. & H., p. 186
6. Smaller, 8 to 11 mm. First genital segment with median keel at base (Pl. XXIV, fig. *a*).....*canaliculatus* Say, p. 187
 Larger, 12 to 20 mm. First genital without median keel at base.....7
7. Body long, with very long legs. Apex of first genital segment almost truncate (Pl. XXIII, fig. *d*).....*notabilis* D. & H., p. 189
 Shorter, with shorter legs. Apex of first genital segment slightly roundly produced (Pl. XXIII, fig. *f*).....*dissortis* D. & H., p. 188
8. Connexiva not produced into distinct spines at apex. Segment I of antennæ not or scarcely more than three-fifths as long as II and III conjoined. Anterior femora strongly curved.....20
 Connexiva distinctly produced at apex. Segment I of antennæ as long as or almost as long as II and III conjoined. Fore femora not strongly curved.....9

9. Large robust species (11 mm. or more). Connexival spines rather long and conical. First genital segment with very prominent, strongly elevated keel. 10
 Smaller species (less than 11 mm.). Connexival spines shorter, angular. First genital segment with keel only moderately prominent or absent. 11
10. Larger, usually more or less brownish in coloration. Male genital segment as in Pl. XXIII, fig. *c*. *remigis* Say, p. 189
 Smaller, with shorter legs and antennæ. Color deep black (Pl. XXIII, fig. *b*). *nyctalis* D. & H., p. 190
11. First genital segment beneath with conspicuous, long, silvery hairs on each side. 12
 Genital segment without long hairs. 13
12. Antero-lateral margins of pronotum with a more or less distinct brownish line. First genital segment with hairs arranged in rows along each side of median ridge (Pl. XXII, fig. *a*). *incognitus* D. & H., p. 193
 Pronotum without pale stripe along side margin in front. Hairs on first genital segment forming a distinct tuft (Pl. XXII, fig. *c*).
comatus D. & H., p. 193
13. Antero-lateral margins of pronotum with a silvery or rufous stripe. 17
 Antero-lateral margins without pale stripe. 14
14. Omphalium strongly produced, very prominent. *alacris* Hussey, p. 192
 Omphalium not especially prominent. 15
15. First genital segment plump, scarcely impressed on each side. (Pl. XXII, fig. *b*). *insperatus* D. & H., p. 190
 First genital segment strongly impressed on each side. 16
16. Notch at hind margin of sixth venter broadly rounded (Pl. XXII, fig. *j*).
incurvatus D. & H., p. 192
 Notch at apex of sixth venter deeper, not so broadly rounded (Pl. XXII, fig. *f*). *marginatus* Say, p. 191
17. First genital segment as broad as long, the notch in middle at apex of sixth venter subrectangular (Pl. XXII, fig. *e*). *buenoi* Kirk, p. 195
 First genital segment distinctly longer than broad, narrowed posteriorly, median apical notch of venter rounded. 18
18. Antero-lateral stripe of pronotum silvery. Male genital segment as in Pl. XXII, fig. *k*. *argenticollis* Parsh., p. 196
 Antero-lateral stripe of pronotum flavous to brownish. 19
19. Connexivum above with small silvery spots between the segments. Genital segments as in Pl. XXII, fig. *h*. *gillettei* L. & S., p. 194
 Connexivum without silvery spots. Genital segment, Pl. XXII, fig. *i*.
pingreensis D. & H., p. 194
20. Metasternum and venter with distinct or fairly distinct median carina. First genital segment longer than broad. Pronotum extending on mesonotum in apterous form. 21
 Metasternum and venter not carinate. First genital segment short, broader than long (Pl. XXIV, fig. *c*). Pronotum in apterous form not extending back over mesonotum. *flavolineatus* Champ., p. 197

21. Fore femora strongly curved from the base, suddenly dilated beneath into a tubercle-like prominence. Omphalium more or less prominent 22
 Anterior femora much more flattened on basal half, without distinct tubercle-like prominence. Metasternum without stout oblong prominence 25
22. First antennal segment in length distinctly greater than width of head thru eyes. Protuberance of front femora near basal third.
carmelus D. & H., p. 201
 First antennal segment in length subequal to or less than width of head thru eyes. Femoral protuberance at or beyond the middle 23
23. Fore femora with prominence at middle. Front lobe of pronotum in apterous form only moderately elevated 24
 Front femora with prominence at distal third. Anterior lobe of pronotum in apterous form strongly elevated *beieri*, n. sp., p. 200
24. Omphalium very strongly developed, forming an oblong prominence. Genital segments, Pl. XXIV, fig. *b* *cariniiventris* Champ., p. 197
 Omphalium not especially prominent *kahli*, n. sp., p. 199
25. Mesonotum in apterous form covered by pronotum.
mexicanus Champ., p. 196
 Pronotum of apterous form not reaching to middle of mesonotum.
fuscinervis (Berg), p. 198

1. *Gerris conformis* (Uhler) (Pl. XXIII, fig. *a*)

Hygrotrechus conformis Uhler, Proc. Bost. Soc. Nat. Hist., XIX, 1878, p. 435.

Gerris conformis Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 271, fig.

1, *g*.

Dark brownish black; slightly longer, more robust, and with longer legs than *G. uhleri* D. & H. Antennæ dark brownish black; segment I distinctly longer than II and III taken together, II and IV subequal, III slightly shorter than II. Pronotum without pale line along sides in front; median carina quite distinct in alate form. Hemelytra brownish black. Venter dark cinereous, with small silvery spots on each side between the segments as in *uhleri*. Connexiva margined with brown, the terminal spines very long, blackish.

♂. Venter usually with median brownish line, broadly, roundly emarginate behind. First genital segment plump at the base, strongly impressed on each side behind, thus forming a median triangular keel (Pl. XXIII, fig. *a*).

♀. Very similar to *G. nebularis* D. & H. but recognizable by the longer first antennal segments and connexival spines.

Size: Length, 15.00-16.50 mm.; width, 2.70 mm.

Specimens have been examined from New York, Maryland, Pennsylvania, New Jersey, Massachusetts, District of Columbia, Virginia, North Carolina, Ohio, and Michigan.

2. *Gerris nebularis* Drake and Hottes (Pl. XXIII, fig. e)

Gerris nebularis Drake and Hottes, Proc. Biol. Soc. Wash., 38, 1925, p. 70; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 270, fig. 1, C.

Allied to *conformis* and *uhleri* with which it agrees in general color and markings. Antennal segment I shorter than in *conformis*. Pronotum without stripes along side margins in front. Hemelytra often abbreviated, then usually not extending beyond middle of second or third abdominal segment.

♂. Connexival spines reaching a little beyond the first genital segment. Sixth venter with a very broad, deep, median furrow, widely and roundly emarginate behind (Pl. XXIII, fig. e). First genital segment with a broad high keel along its entire length, the areas to each side of the keel strongly impressed.

♀. Venter with a narrow median ridge. Connexival spines slightly shorter than in *conformis*.

Size: Length, 14.00-16.00 mm.; width, 2.35 mm.

Type, male, Florida, in collection of writers. Specimens are at hand from New York, New Jersey, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Tennessee, Illinois, Ohio, Iowa, Missouri, Kansas, and Nebraska. This species is quite distinct from *conformis*, with which it was confounded in the literature for many years.

3. *Gerris uhleri* Drake and Hottes (Pl. XXIII, fig. g)

Gerris uhleri Drake and Hottes, Proc. Biol. Soc. Wash., 38, 1925, p. 69; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 271, fig. 1, e.

Elongate, moderately robust, brownish black. Antennæ brownish black, segment I slightly curved, distinctly longer than II and III conjoined, II subequal to IV and slightly longer than III. Anterior lobe of pronotum longitudinally depressed along the disc, there with a flavous line, side margins with some indications of a silvery line; posterior lobe with a rather distinct longitudinal ridge. Legs slightly shorter than in either *conformis* or *nebularis*. Venter densely clothed with silvery sericeous pile, each side with four small patches of longer, silvery hairs. Connexival spines long, reaching slightly beyond genital segments.

♂. Sixth venter deeply, sub-angularly emarginate behind (Pl. XXIII, fig. g); first genital segment with short, posteriorly directed, triangular keel at base.

♀. Connexival spines very long, slightly curved. Genital segments smaller and plumper than in *nebularis*, faintly impressed on the sides.

Size: Length, 14.50 mm.; width, 2.26 mm.

Known only from the type locality, Arizona (U. S. N. M.). In general appearance this species resembles *G. conformis* and *G. nebularis*. It is recognizable by the shape of the hind margin of the sixth venter and the shape and position of the keel on the first genital segment of the male. Only long winged individuals have been described.

4. *Gerris chilensis* (Berg)

Limnotrechus chilensis Berg, Ann. Soc. Cient. Argentina, XXII, 1881, p. 263.

Gerris chilensis Lethierry and Severin, Cat. Gén. Hémipt., III, 1896, p. 60; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 208.

Large, moderately robust, brownish black to black. Densely clothed with golden pubescence. Antennæ dark brown, segment I longer than next two conjoined, II and IV subequal, III slightly shorter than II. Anterior lobe of pronotum longitudinally depressed on the disc, there with a short flavous line along the middle. Connexiva terminating in very short spines.

♂. Sixth venter deeply and very broadly excavated behind, nearly sub-truncate at the middle. First genital segment transversely impressed at base, without keel. Connexival spines very short, much shorter than in any other of the larger forms with a single emargination at apex of venter.

♀. Connexival spines a little longer than in the male, extending to the middle of first genital segment.

Size: Length, 10.00-11.00 mm.; width, 1.50 mm.

Known from Chile, Venezuela, and Peru. Specimens from Chile (det. by Berg) have been examined. The sixth venter of the male is broadly deeply emarginate behind as in the *conformis* group.

5. *Gerris canaliculatus* Say (Pl. XXIV, fig. a)

Gerris canaliculatus Say, Heter. N. Harmony, 1832, p. 36; Torre-Bueno, Trans. Amer. Ent. Soc., XXXVII, 1911, p. 248; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 272.

Elongate, slender, varying from brownish black to black, sometimes reddish; testaceous beneath, with silvery reflection, the venter usually darker. Pronotum extending over mesonotum in apterous form, longitudinally carinate down the middle in both wingless and winged individuals, with a median fulvous line on front lobe; antero-lateral stripe not quite attaining the front margin. Antennæ brownish, segment I curved near base, considerably shorter than II and III conjoined; II faintly longer than III; IV subequal to I in length. Legs long, slender, brown.

♂. Connexival spines long, slender, slightly divaricating, reaching to the tip of first genital segment. Sixth venter broadly roundly excavated behind. First genital segment very broad, cylindrical; beneath with short, low, basal keel, strongly impressed before apex (Pl. XXIV, fig. a).

♀. Sixth venter produced behind at the middle. Connexival spines long, usually extending beyond last genital segment. First genital segment strongly compressed behind, hairy along hind margin.

Size: Length, 8.15-10.84 mm.; width, 1.00-1.25 mm.

A widely distributed lacustrine species ranging from New York to Iowa and south into Florida and Louisiana, and becoming more abundant in the southern part of its range. It is highly variable in both size and color, occasionally being quite reddish. Both apterous and macropterous forms occur in most large schools, the former tending to be darker in color. The long connexival spines and hind margin of sixth venter of male serve to separate it at a glance from the smaller members of this genus.

6. *Gerris dissortis* Drake and Harris (Pls. XXI; XXIII, fig. f)

Gerris rufoscutellatus Riley, Ent. Rec. and Journ. Var., XXVII, 1925, pp. 65-72, 86-93, and 109-115.

Gerris dissortis Drake and Harris, Bull. Brooklyn Ent. Soc., XXV, 1930, p. 145.

Ferruginous to rufescent, the nervures of the hemelytra brownish black. Beneath clothed with silvery hairs. Pronotum with a very large black spot on each side of median line in front; sides with a very broad yellowish brown line; median ridge indistinct at times, paler in color. Antennæ long, reddish brown, the last segment and the tips of others darker; segment I much shorter than II and III conjoined, II and IV subequal in length, each a little longer than III. Legs very long.

♂. Genitalia very much as in *G. notabilis*, the hind margin of first genital segment slightly, roundly produced at the middle (Pl. XXIII, fig. f).

♀. Slightly larger than male, the legs longer. Distinguished from *notabilis* by the smaller size and the much shorter antennæ and legs.

Size: Length, 12.00-14.50 mm.; width, 1.60-2.00 mm.

Types in collection of the authors. Until recently this species has been confused in the literature with the European *G. rufoscutellatus* Latr. and *G. notabilis* D. & H. Records of *rufoscutellatus* in Eastern U. S. pertain almost entirely to this species. Specimens have been seen from Maine, Massachusetts, New York, Rhode Island, Connecticut, New Jersey, Maryland, Delaware, Pennsylvania, Michigan, Indiana, Illinois, Kentucky, West Virginia, Iowa, Missouri, Kansas,

Nebraska, Wisconsin, Minnesota, and Eastern Canada. It is replaced in the West by *G. notabilis* D. & H. Only the macropterous form is known.

7. ***Gerris notabilis*** Drake and Hottes (Pl. XXIII, fig. *d*)

Gerris notabilis Drake and Hottes, Ohio Jour. Sci., XXV, 1925, p. 46; Drake and Harris, *ibid.*, XXVIII, 1928, p. 272, fig. 1, *d*.

Very elongate, reddish brown, the legs very long. Antennæ brown, segment IV and the tips of I, II, and III darker; I very long, considerably shorter than II and III taken together, III and IV subequal, each shorter than II. Anterior lobe of pronotum with a large black spot on each side; the space between and the side margins concolorous with rest of pronotum. Body beneath with silvery hairs.

♂. Antennæ and intermediate and posterior legs often much longer than in female. First genital almost truncate behind (Pl. XXIII, fig. *d*).

♀. Connexival spines long, slightly sinuate. Legs and antennæ much longer than in *dissortis*.

Size; Length, 15.00-20.00 mm.; width, 2.00-2.50 mm.

This is a common western species inhabiting the streams of the Pacific Coast and Rocky Mountain states, and occasionally ranging east into Iowa; frequently occurring in large schools on the surface of the mountain lakes. It has the longest body and legs of the American species of Gerrinæ. Specimens have been seen from California, Oregon, Washington, British Columbia, Idaho, Montana, Wyoming, Utah, Colorado, and Iowa. The records of *G. rufoscutellatus* Latr. from the Rocky Mountain region and Pacific slope pertain almost entirely to *notabilis*. Only the macropterous form is known.

8. ***Gerris remigis*** Say (Pl. XXIII, fig. *c*)

Gerris remigis Say, Heter. New Harmony, 1832, p. 35; Torre-Bueno, Ent. News, XXVIII, 1917, pp. 201-208; Riley, Ann. Ent. Soc. Amer., XIV, 1921, pp. 231-289; Essenberg, Jour. Animal Behavior, V, 1915, 397-402; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 269, fig. 1, *a*.

Gerris orba Stål, Freg. Eugen. Resa, Ins., 1859, p. 264.

Hygrotrechus robusta Uhler, Am. Jour. Sci., Ser. 3, I, 1871, p. 105.

Robust, elongate, color variable, usually brownish black, sometimes reddish brown; beneath thickly clothed with grayish pubescence. Antennæ brownish black; segment I subequal in length to II and III taken together; III subequal to II and a little shorter than IV. Connexiva with prominent silvery or golden spots at the junctions of the segments. Anterior lobe of pronotum with a broad median flavous to rufous line.

♂. Sixth venter considerably impressed, the second emargination at middle behind deeply and roundly excavated. Connexival spines moderately long. First genital segment with median keel very broad, long and prominent; very strongly impressed on each side (Pl. XXIII, fig. c).

♀. Connexival spines shorter than in male, extending approximately to end of genital segments.

Size: Length, 11.50-16.00 mm.; width, 3.00-4.00 mm.

This is the commonest and most widely distributed of the larger gerrids in North America. Specimens have been examined from every state in the Union, also from Canada and Mexico. It has been recorded from as far south as Guatemala. Both apterous and macropterous forms are not uncommon.

9. *Gerris nyctalis* Drake and Hottes (Pl. XXIII, fig. b)

Gerris nyctalis Drake and Hottes, Ohio Jour. Sci. XXV, 1925, p. 47; Drake and Harris, *ibid.*, XXVIII, 1928, p. 269, fig. 1, b.

Robust, blackish, sparsely pubescent, the silvery patches of connexiva much smaller than in *remigis* Say. Antennæ shorter (especially the first segment), but proportional lengths about the same as in *remigis*.

♂. Keel of first genital segment narrower than in *remigis* (Pl. XXIII, fig. b).

♀. Venter broader than in *remigis*. Genital segments blackish.

Size: Length 11.00-13.00 mm.; width, 2.50-3.50 mm.

Akin to *remigis* but distinguished by its darker color and shorter first antennal segment. It inhabits the Rocky Mountain regions, often occurring in abundance in lakes at high altitudes. Specimens have been seen from Idaho, Colorado, Montana, Washington, California, eastern British Columbia, and Newfoundland. Although it is usually found in the apterous form, macropterous specimens are not rare. Type, male, is in the collection of the authors.

10. *Gerris insperatus* Drake and Hottes (Pl. XXII, fig. b)

Gerris insperatus Drake and Hottes, Proc. Biol. Soc. Wash., 38, 1925, p. 71; Blatchley, Heter. E. North Amer., 1925, p. 975; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 270.

Form, size, and markings similar to *G. marginatus*. Antennal segment I slightly shorter than II and III conjoined and about one-seventh longer than IV; II and III subequal in length. Apterous and brachypterous forms unknown.

♂. Omphalium not prominent. Venter with median carina becoming more evident apically than in *marginatus*, deeply and roundly notched in middle behind. First genital segment very short, quite plump, very faintly impressed on each side, without distinct median keel (Pl. XXII, fig. b).

♀. Connexiva, except outer margins, yellowish, the apical spines a little shorter and thicker than in *marginatus*. Genital segments beneath and lateral margins of first above yellowish.

Size: Length, 7.40-8.60 mm.; width, 2.30-2.50 mm.

The apical notch of sixth venter and the genital segments readily identify the male. Female specimens, however, are very difficult to separate from *marginatus* and two or three other species, the thicker connexival spines being the primary external characters. *Insuperatus* ranges throughout the eastern portion of North America, from Quebec and Ontario, west to Colorado and then south into Mexico. Type, male, from Mexico, is in the U. S. National Museum.

11. *Gerris marginatus* Say (Pl. XXII, fig. f)

Gerris marginatus Say, Heter. N. Harmony, 1832, p. 36; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 271.

Antennæ moderately short, segment I subequal in length to II and III conjoined, and scarcely longer than IV. Pronotum without lateral stripe on anterior lobe.

♂. Venter with a deep, rounded notch in middle at apex. Genital segment I with distinct median ridge, strongly impressed on each side, clothed with fine short pile (Pl. XXII, fig. f).

♀. Connexival spines moderately thick, extending to apex of first genital segment.

Size: Length, 8.21-10.35 mm.; width, 2.32-2.55 mm.

The literature pertaining to this species is much involved, for until quite recently *incognitus*, *comatus*, *incurvatus*, *alacris*, *pingreensis*, *insperatus*, and perhaps one or two other distinct forms have been confused in collections, and included in scientific papers under the name *marginatus*. It is also impossible to accredit the papers on ecology and life history entirely to *marginatus* as observations, in most cases, were based on two, three or more species.

Marginatus is probably the commonest and most widely distributed member of the genus in the Americas, save perhaps *remigis*. It is known to occur in every state in the United States, and also in Canada, Mexico, and Brazil.

12. **Gerris incurvatus** Drake and Hottes (Pl. XXII, fig. j)

Gerris incurvatus Drake and Hottes, Proc. Biol. Soc. Wash., 38, 1925, p. 72; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 270.

Form, size, and color similar to *marginatus*. Antennal segment I slightly longer than II and III conjoined, about one-third longer than IV; II scarcely longer than III.

♂. Venter with median apical notch deeper, narrower at base, and more rounded than in *marginatus*; first genital segment more strongly impressed on each side, the median keel broad at base (Pl. XXII, fig. j).

♀. Easily recognized by the strongly incurved connexival spines, the tips of which are clothed with short, stiff hairs.

Size: Length, 7.60-8.70 mm.; width, 2.30-2.50 mm.

Inhabits the northwestern part of the United States and adjacent territory in Canada, Washington, Oregon, California, Idaho, Montana, and British Columbia. Two examples have also been examined from the state of Illinois. In the short-winged form, heretofore unknown, the hemelytra extend slightly beyond the base of the fourth dorsum. Type, British Columbia, is in collection of the authors.

13. **Gerris alacris** Hussey (Pl. XXII, fig. l)

Gerris alacris Hussey, Psyche, XXVIII, 1921, p. 11, fig. 1; Blatchley, Heter. E. N. America, 1925, p. 975; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 272.

Antennæ brown, the last two segments darker; segment I subequal in length to II and III conjoined; II and III subequal, each one-third shorter than IV. Pronotum longitudinally carinate, with median brownish stripe on anterior lobe. Apterous, macropterous and brachypterous forms common; in the latter the hemelytra extend to about middle of third abdominal segment.

♂. Mesosternum with extremely large, prominent omphalium. Sixth venter with the sides of the second emargination straighter than in *marginatus*. First genital segment short, moderately impressed on each side.

♀. Connexival spines very short, their apices not attaining the middle of first genital segment.

Size: Length, 7.00-10.00 mm.; width, 2.10-2.90 mm.

Described from Michigan (types* in collection of the University of Michigan) and known only from there, Hocking County, Ohio, and Washington, D. C. A very distinctive species by reason of the extremely large omphalium in the male.

14. *Gerris comatus* Drake and Hottes (Pl. XXII, figs. *c* and *d*)

Gerris comatus Drake and Hottes, Ohio Jour. Sci., XXV, 1925, p. 48; Drake and Harris, *ibid.*, XXVIII, 1928, p. 270.

Size, color, and general appearance similar to *marginatus*. Antennal segment I subequal in length to II and III conjoined; IV a little shorter than I. Apterous, short-, and long-winged forms frequently taken in the same pond or stream.

♂. With a large tuft of very long pale hairs in the impression on each side of the median ridge of first genital segment. Last venter with second emargination very similar to that in *marginatus* (Pl. XXII, fig. *c*).

♀. Connexival spines much more strongly incurved, and clothed with longer, more bristly hairs than *marginatus*.

Size: Length, 7.35-9.20 mm.; width, 2.30-2.80 mm.

Common, ranging from the Atlantic Ocean west to Montana. Specimens are at hand from New York, Iowa, South Dakota, Minnesota, Kansas, Missouri, Nebraska, Colorado, Indiana, Michigan, Pennsylvania, Ohio, Illinois, New Jersey, Maryland, and Ontario, Canada. A very distinctive species by reason of the two conspicuous tufts of long hairs on the inferior side of the first genital segment of the male. The type is in the collection of the authors.

15. *Gerris comatus mickeli* Drake and Hottes

Gerris comatus mickeli Drake and Hottes, Ohio Jour. Sci., XXV, 1925, p. 270.

This variety differs from the typical *comatus* in having a marginal stripe on each side of the anterior lobe of pronotum, and more numerous and longer hairs on the connexival spines.

Known only from brachypterous female specimens, taken in Minnesota, Colorado, and Oregon. The male is unknown. On this account it seems advisable to treat *mickeli* as a variety of *comatus* rather than as a distinct species. The type is in the collection of the writers.

16. *Gerris incognitus* Drake and Hottes (Pl. XXII, fig. *a*)

Gerris incognitus Drake and Hottes, Proc. Biol. Soc. Wash., 38, 1925, p. 73; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 270.

Antennæ reddish brown to blackish, the basal portion of segment I, the apices of I, II and III, and all of IV darker; segment I slightly shorter than II and III conjoined, II and III subequal in length, IV a little shorter than I. Pronotum with a fairly distinct longitudinal

carina, the anterior lobe with a yellowish or russet-brown stripe on each side along lateral margin and also down median line. Wings often absent, when present reaching to middle of last abdominal or beyond first genital segment.

♂. Venter strongly depressed posteriorly, the three apical segments with faint, median, yellowish brown carina; deeply, widely, and roundly notched at the middle behind. Connexival spines short, blunt. First genital segment elongate; beneath strongly impressed on each side of median ridge and there with a rather dense row of long hairs (Pl. XXII, fig. *a*).

♀. Connexival spines stout, blunt, and projecting obliquely upward. First genital segment narrowed posteriorly, truncate at apex. Wingless form with a large tumid area above at base of abdomen.

Size: Length, 8.50-9.50 mm.; width, 2.50-2.90 mm.

Common in western United States. Known from Washington, Oregon, California, Montana, and Idaho. Specimens have also been examined from British Columbia and Quebec. The holotype (male) and allotype (female) from Kaslo, B.C., are in the U. S. National Museum.

17. ***Gerris pingreensis*** Drake and Hottes (Pl. XXII, fig. *i*)

Gerris pingreensis Drake and Hottes, Ohio Jour. Sci., XXV, 1925, p. 49; Drake and Harris, *ibid.*, XXVIII, 1928, p. 272.

Resembles *gillettei* in form, size, and color, but distinguishable by the more tumid first abdominal tergite and the lack of silvery spots between the segments of connexivum. Antennæ moderately short; segments I and IV subequal in length, II much shorter, a little longer than III.

♂. Venter darker, the longitudinal sulci on sixth segment deeper, and the median apical notch slightly broader at base than in *gillettei* (Pl. XXII, fig. *i*).

♀. Connexival spines very much longer than in male, shorter than in *gillettei*, in apterous individuals reflexed, almost vertical.

Size: Length, 9:00-10:00 mm.; width, 2.00-2.50 mm.

Found in abundance in the streams and lakes of the higher altitudes of Montana, Colorado, and Idaho and of Alberta, Canada. A very distinct species by reason of the male genitalia and the connexival spines in both sexes.

18. ***Gerris gillettei*** Lethierry and Severin (Pl. XXII, figs. *g* and *h*)

Limnotrechus productus Uhler, Hemip. Colo., 1895, p. 61.

Gerris gillettei Lethierry and Severin, Cat. Génl. Hémip., III, 1896, p. 60; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 272.

Larger and more robust than *marginatus*. Antennæ with segment I shorter than II and III conjoined and about one-fifth longer than IV, II and III subequal. Pronotum with a russet-brown stripe along antero-lateral margins. Wings absent or reaching to middle of genital segments. Apterous form with bases of thorax and abdomen above somewhat tumid; connexival spines shorter than in macropterous form.

♂. Venter yellowish testaceous apically, the sixth segment distinctly flattened and with a long conspicuous sulcus on each side of the narrow median ridge, the second emargination as in Pl. XXII, fig. *h*. First genital segment rather plump, faintly impressed on each side, without noticeable vestiture.

♀. Abdomen somewhat flattened beneath. Genital segment strongly compressed laterally. Connexival processes long, curved inwards and upwards, considerably longer in macropterous than in brachypterous form (Pl. XXII, fig. *g*).

Size: Length, 8.60-10.50 mm.; width, 1.70-2.30 mm.

This is a western species. Specimens have been seen from Washington, Oregon, California, Montana, Utah, Colorado, and Texas. It may be recognized by the presence of conspicuous silvery spots at the outer angles of the connexival segments. The type of *productus* is in the collection of Colorado Agricultural College.

19. *Gerris buenoi* Kirkaldy (Pl. XXII, fig. *e*)

Gerris buenoi Kirkaldy, Ent. News, XXII, 1911, p. 246; Torre-Bueno, Trans. Amer. Ent. Soc., XXXVII, 1911, p. 248; Parshley, Ent. News, XXVII, 1916, pp. 103, 104, fig. *c*; Hoffman, Ann. Ent. Soc. Amer., XVII, 1924, pp. 424-426; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 272.

Short, robust. Antennal segment I shorter than II and III conjoined, one-fifth longer than IV; III scarcely shorter than II. Pronotum with median and antero-lateral stripes flavescent to russet-brown in color. Venter with indistinct median keel.

♂. Sixth venter with median notch very broad and deep. First genital segment very broad, transversely impressed beneath (Pl. XXII, fig. *e*).

♀. Connexival spines short. Genital plates beneath very broad, somewhat flattened.

Size; Length, 7.00-8.21 mm.; width, 1.31-1.60 mm.

A transcontinental species ranging throughout the northern part of the United States and southern Canada. Readily recognized by its size, form, and genital structures. Apterous, half-winged and fully winged specimens frequently are taken in the same school. The type is in the Kirkaldy collection, U. S. National Museum.

20. *Gerris argenticollis* Parshley (Pl. XXII, fig. *k*)

Gerris argenticollis Parshley, Ent. News, XXVII, 1916, p. 103, fig. *a*; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 272.

Moderately large. Pronotum with median and antero-lateral stripes yellowish, the latter clothed with silvery pubescence. Antennal segments II and III subequal in length, each about half as long as I and one-fifth longer than IV. Hemelytra whitish between the nervures along the inner margins at the base. Venter with distinct median carina.

♂. Sixth venter with median apical notch much narrower and more rounded than in *buenoi*. First genital segment also narrower and not so strongly produced beneath at apex, feebly impressed behind on each side of narrow median ridge (Pl. XXII, fig. *k*).

♀. Connexival spines short, stout. First genital segment slightly wider than long, carinate toward the base and strongly impressed on each side before the middle.

Size: Length, 7.00-8.50 mm.; width, 1.62-1.80 mm.

Type, from Massachusetts, in Parshley collection. Ranges from Massachusetts west through Indiana and Illinois and south into North Carolina and Louisiana. Related to *G. buenoi* and replacing it to some extent in the southern part of the United States.

21. *Gerris mexicanus* Champion

Gerris mexicanus Champion, Biol. Centr. Amer., Rhynch., II, 1898, p. 147, Pl. IX, fig. 10; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 209.

Winged form: Rather elongate, robust; brownish black to black, markings on head and median line on front of pronotum ochraceous, the hind lobe of pronotum largely brownish testaceous or reddish brown. Antennæ rather stout, segment I about one-half longer than II, II-IV subequal in length. Anterior femora stout. Hind tarsi with segment I two and one-half times as long as II. Hemelytra extending beyond tip of abdomen. Connexiva not produced apically.

Apterous form: Pronotum covering mesonotum, the anterior lobe slightly raised and rather sharply demarcated; hind lobe reddish brown.

♂. Anterior femora curved from the base, concave and flattened on basal half beneath, distinctly dilated towards the apex on the lower side. Sixth venter deeply emarginate behind, the median notch rather broad. First genital short and plump beneath, without keel.

♀. More robust than male. Venter subtruncate behind, the last segment not quite as long as the preceding.

Size: Length, 8.50-12.00 mm.; width, 2.80-3.50 mm.

Known only from Mexico. Two females and a male specimen have been studied. Although a little smaller, this species has somewhat the general facies of *G. remigis* but is easily distinguishable from it by the characters given above and in the key.

22. *Gerris flavolineatus* Champion (Pl. XXIV, fig. c)

Gerris flavolineatus Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 149, Pl. IX, figs. 13-15; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 209.

Winged form: Broad, robust, male much smaller and narrower than female; above brownish black to black, a curved band at base of head and a narrow longitudinal vitta on disc of pronotum ochraceous; sides of head before the eyes, and sides of both anterior and posterior lobes of pronotum reddish brown. A spot on middle and posterior acetabula, and a broad line on sides of mesothorax silvery. Body beneath somewhat silvery. Sides of thorax largely black, sometimes lighter. Anterior femora brownish, with a broad blackish longitudinal stripe without; tibiæ straight, blackish; tarsi black. Antennæ with segments II to IV subequal, I about one-third longer than II.

Apterous form: Pronotum short, not produced over mesonotum, the latter variable in color, usually more or less ochraceous.

♂. Anterior femora stout, strongly curved at base, hollowed beneath. Sixth venter not quite as long as the two preceding segments, subangularly emarginate in the middle behind. Connexiva not produced behind. First genital segment plump, emarginate at apex (Pl. XXIV, fig. c).

♀. Anterior femora thinner and only feebly curved at base.

Size: Length, 5.20-10.00 mm.; width, 2.00-3.50 mm.

Type in the British Museum; paratypes have been examined, also a long series of apterous and winged specimens from Guatemala. Known from Mexico, Guatemala, and Ecuador.

23. *Gerris cariniventris* Champion (Pl. XXIV, fig. b)

Gerris cariniventris Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 148, Pl. IX, figs. 11-12; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 208.

Winged form: Black, a median line on front lobe of pronotum, the lateral margins and sometimes hind margins of pronotum, pleura in greater part, markings on head, the coxæ, and margins of connexiva ochraceous; body beneath lighter. Antennæ rather slender, segments II-IV subequal in length, I about one-fourth longer than II. Anterior lobe of pronotum short, rather sharply demarcated; posterior

lobe rounded behind, transversely raised between the tumid humeri, more or less distinctly carinate down the middle. Sides of thorax with prominent silvery markings.

Apterous form: Pronotum produced backwards and extending about to middle of mesonotum, rounded behind; mesonotum ochraceous to reddish brown, sometimes marked with a small blackish patch in front.

♂. Anterior femora stout, curved at base, subangularly dilated on the inferior surface, forming a distinct protuberance at the middle; tibiæ slightly curved. Omphalium very prominent. Venter carinate down the middle, the sixth segment much longer than the preceding, the second emargination at middle behind deep and rounded (Pl. XXIV, fig. *b*). Connexiva not terminating in spines.

♀. Much larger and stouter than male. Anterior femora feebly curved at base, without prominence. Metasternum carinate. Connexiva not strongly narrowed posteriorly, truncate at apex.

Size: Length, 7.50-10.50 mm.; width, 2.30-3.20 mm.

Type in British Museum; paratypes have been examined. Recorded in the literature from Mexico, Guatemala, Costa Rica, Panama, and Hayti. A long series of apterous and winged specimens are at hand from Guatemala and British Honduras.

24. *Gerris fuscinervis* (Berg)

Brachymetra fuscinervis Berg, Com. Mus. Buenos Aires, I, 1898, p. 3; Pennington, List Hemip. Heterop., Repub. Argentina, 1921, p. 31.

Gerris perseus Kirkaldy, Bull. Mus. Zool. Anat. Comp. Torino, XIV, 1899, No. 351, p. 1.

Gerris andromeda Kirkaldy, Bull. Mus. Zool. Anat. Comp. Torino, XIV, 1899, No. 351, p. 2, figs. 8, 9.

Gerris fuscinervis Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 208.

Apterous form: Moderately large, brownish black to black. Antennæ blackish; proportions—(male) 60:36:36:42, (female) 75:40:38:45. Posterior lobe of pronotum covering about half of mesonotum, broadly rounded behind; anterior lobe with median longitudinal stripe and a narrow stripe on each side ochraceous. Sides of thorax blackish, becoming darker above, with a prominent silvery streak on the meso- and metapleura. Body beneath yellowish brown with grayish pubescence. Mesosternum channeled anteriorly. Sides of abdomen blackish.

♂. Sixth venter subequal in length to the preceding two segments conjoined, with a deep, very broad, rounded notch at the middle behind. First genital segment plump beneath, moderately narrowed distally. Front lobe of pronotum (apterous form) quite strongly raised, depressed on disc; posterior lobe reaching to middle of mesonotum. Mesonotum tumid behind, mostly ochraceous. Connexiva narrowed

posteriorly, truncate behind. Anterior femora short, stout, very strongly curved at the base, there hollowed beneath.

♀. Larger and broader than male. Anterior lobe of pronotum impressed, with a prominent tubercle on each side in front; hind lobe (apterous form) broader and a little longer than in male. Connexiva broader behind than in male, truncate at apex. Sixth venter in length subequal to the preceding two segments, clothed with long hairs on the hind margin.

Size: Length, 6.30-8.50 mm.; width, 2.00-3.10 mm.

Recorded in the literature from Ecuador, Bolivia, and Argentina. Specimens labelled "*cum type comparat*" by Berg in the U. S. National Museum have been studied, also numerous examples from Cordoba, Argentina. Type is in the La Plata Museum, Argentina.

25. *Gerris kahli*, sp. nov.

Apterous form: Blackish, a median line on anterior lobe of pronotum, mesonotum, sides and body beneath reddish brown. Antennæ dark brown; proportions—(male) 55:46:60:54, (female) 62:60:70:58. Pronotum of male with anterior lobe more tumid and slightly more impressed on the disc than in female; antero-lateral angles raised and prominent in female; posterior lobe broadly rounded behind, extending over anterior half of mesonotum, transversely rugose. Mesonotum tumid and prominent.

Winged form: Pronotum very large, black, with golden pubescence, tumid behind, the humeri prominent; anterior lobe impressed on the disc, there with a short median stripe. Hemelytra black. Body a little longer and slenderer than in apterous form.

♂. Anterior femora strongly curved at base, strongly dilated at the middle beneath, there forming a tubercle-like prominence, this and end of trochanter densely set with brownish black hairs. Fore tibiæ slightly curved. Omphalium fairly prominent. Venter with basal two segments carinate, last segment as long as the two preceding, and deeply, broadly, roundly notched in middle at apex. First genital segment long, cylindrical. Connexiva moderately broad, sometimes with brown markings, strongly narrowed posteriorly, not produced at apex.

♀. Much larger and stouter than male, with silvery stripe along the sides of thorax extending over acetabula. Connexiva broader than in male, not so strongly narrowed posteriorly. Venter with hind margin truncate, and strongly ciliate. Metanotum (apterous form) not raised on each side as in male.

Size: Length, 8.10-9.41 mm.; width, 1.62-2.42 mm.

Holotype, apterous male, and *allotype*, apterous female, Elvecia, near Mt. Turumquire, Sucre, Venezuela, collected by Mr. G. Netting; in collection of Carnegie Museum. *Paratypes*, numerous apterous

and winged specimens taken with type. This insect is named in honor of Dr. Hugo Kahl, Curator of insects at Carnegie Museum, who is keenly interested in the insect fauna of the Americas. In general appearance and markings similar to *G. cariniventris* Champ. and *G. carmelus* D. & H. The protuberance on the inferior surface of the fore femora of the male together with the antennæ and omphalium serve as discriminative structures.

26. *Gerris beieri*, sp. nov.

Apterous form: Akin to *G. cariniventris* Champ., but recognizable by the structure of the pronotum, the proportional lengths of antennal segments, and the position of the protuberance on fore femora of male. Head blackish above, reddish brown on the sides and base. Antennæ brownish, the last two segments darker; proportions—(male) 75:53:55:50, (female) 105:76:75:63. Rostrum reaching upon the anterior portion of mesosternum, the apical segment blackish. Pronotum with the sides and a median streak reddish brown, slightly depressed on the disc; posterior lobe black, transversely rugose, rounded behind, projecting over three-fourths of mesonotum. Mesonotum reddish brown, sometimes blackish along the sides. Metanotum and abdomen above black. Body beneath yellowish brown. Middle and hind acetabula blackish above.

♂. Anterior lobe of pronotum very strongly raised, tumid; hind lobe much narrower than in female. Connexiva slightly embrowned along the margins, not produced apically. Front femora very broadly and strongly curved at base, paler and hollowed beneath, the protuberance darkened, placed a little before the apex; tibiæ slightly curved, darkened distally. Sixth venter considerably longer than the preceding, the second emargination shallow and rounded. First genital segment beneath plump, subtruncate at apex.

♀. Very much broader and stouter than male. Fore femora slightly curved, without armature. Front lobe of pronotum faintly raised, strongly impressed on the disc, there with a median flavous line; posterior lobe very much broader than in male. The silvery spot on middle and hind acetabula, and the darkened streaks on mesopleura more prominent than in male. Connexiva margined with brown, not produced behind. Sixth venter about two-thirds as long as the preceding segment.

Size: Length, 8.00-10.50 mm.; width, 1.60-2.50 mm.

Holotype, apterous male, and *allotype*, apterous female, Colombia, South America (Thorey); in Vienna Museum. *Paratypes*, two males and four females taken with type. Named in honor of Dr. Max Beier, of the Vienna Museum, who is taking a keen and active interest in South American insects.

27. *Gerris carmelus* Drake and Harris (Pl. XXV, fig. *d*)

Gerris carmelus Drake and Harris, Psyche, XXXIX, 1933, p. 108.

Head black, its sides and inferior surface and a transverse patch above at the base ochraceous, sometimes these markings more or less replaced with black. Antennæ brown, darkened apically; segment I a little longer than II, II and III subequal, each slightly longer than IV. Rostrum ochraceous, the distal segment black, extending on anterior portion of mesosternum. Pronotum black, the sides and a median elongate spot on disc of anterior lobe ochraceous; hind lobe attaining middle of mesonotum, rounded behind. Mesonotum ochraceous, strongly raised, tumid, almost rectangular in outline. Sides of thorax ochraceous, the meso- and metapleura with a longitudinal blackish stripe, this at times extending on propleuron.

♂. Anterior lobe of pronotum strongly raised, sharply delimited. Front femora moderately incrassate, curved at base, the inferior surface a little behind the middle strongly dilated into a prominent blackish tubercle. Venter indistinctly carinate along median line; sixth segment about as long as the preceding two, its apical margin deeply and roundly excavated at the middle behind. First genital segment long, sub-cylindrical.

♀. Broader than male. Anterior lobe of pronotum feebly raised. Metanotum with a prominent, raised callosity on each side, these pale and conspicuously hairy. Connexiva broader than in male, clothed along apical half with brownish hairs, these becoming longer and more numerous distally; apices strongly produced into very long, upwardly curving, hairy processes (Pl. XXV, fig. *d*). Mesosternum and venter carinate down the middle. Sixth segment without carina, more thickly pilose and slightly more than twice as long as the preceding.

Size: Length, 7.00-8.50 mm.; width, 2.00-2.60 mm.

Known only from the type locality, Jamaica. Type in collection of Harvard University. This species is probably most closely related to *G. cariniventris* Champ. and *G. kahli*, sp. nov. It may be recognized by the nature of the front legs and genital segments of the male, and by the very long flattened, connexival processes of the female, which are about two-thirds as long as the segment from which they arise. The color markings are somewhat variable.

28. *Gerris summatis*, sp. nov.

Apterous form: Antennæ brownish; proportions, 62:53:57:58. Head black, the sides in front of eyes, a narrow longitudinal stripe on each side above, and the basal margin reddish brown. Pronotum black, most of the sides of anterior lobe, and an elongate median spot on disc reddish brown; hind lobe sharply rounded posteriorly, not quite reach-

ing the middle of mesonotum. Mesonotum largely reddish brown, strongly tumid posteriorly, there terminating in a point. Mesopleura reddish brown, with a prominent silvery stripe. Abdomen blackish, with a more or less distinct median stripe, connexivum broadly margined with brown, not terminating in a spine behind. Rostrum reaching upon anterior portion of mesosternum, the last segment black. Mesosternum tumid, shallowly channeled anteriorly. Legs brown, the tarsi darker. Metasternum and venter yellowish, carinate down the middle; venter roundly produced behind.

Winged form: Anterior lobe of pronotum scarcely raised, impressed on the disc, a broad stripe on each side and a short median stripe on disc, yellowish brown; posterior lobe with a median carina, the humeri prominent. Wings blackish.

Size: Length, 6.91-8.03 mm.; width, 2.10 mm.

Holotype, apterous female, Rio Sarapiquí, Costa Rica, altitude 2000 meters, collected by Heinrich Schmidt; University of Kansas. *Paratypes*, 1 apterous and 1 winged female, taken with type. The proportional lengths of the antennal segments and the peculiar structure of the mesonotum separate this species from its allies.

II. Genus LIMNOGONUS Stål, 1868

Logotype, *hyalinus* Fabr.

Limnogonus Stål, Hemip. Fabr., I, 1868, p. 132; Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 151; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 210.

Lamprotrechus Reuter, Öfv. Finska Vet. Soc. Förh., XXV, 1882, p. 40.

Tenagogonus Van Duzee, Cat. Hemip., 1917, p. 429 (in part); Anderson, Univ. Kansas, Sci. Bul., XX, 1932, p. 298.

Body short to moderately elongate, the abdomen somewhat abbreviated in certain species, long in others; head and pronotum glabrous, shiny. Antennæ shorter than body, the basal segment longest. Anterior tarsi with first segment short, only about half as long as second. Middle and hind legs very long, the femora extending far beyond the tip of abdomen.

The short basal tarsal segment of fore legs, shorter and stouter antennæ, and the shiny surface of the head and pronotum are the chief characters separating *Limnogonus* from *Tenagogonus* and *Gerris*.

Thirteen species, including six new forms, are recognized from within our limits. The writers have seen specimens of only two of these from north of the Mexican boundary. *Limnogonus franciscanus* Stål, from California, is not treated separately in this paper because of the lack of determined specimens. The species has not been recog-

nized since its description in 1859. It is perhaps conspecific with *guerini* (L. & S.), but the type will have to be examined before it can be identified with any degree of certainty.

It should be noted that in some species female specimens are as yet unknown. Also in certain species both alate and apterous forms have not been described for both sexes. As a consequence of the great structural differences between these forms within a species, it has been impossible to construct a complete key. The table given below, however, will serve to identify all the forms now known.

KEY TO SPECIES OF *Limnogonus*

1. Pale markings on margins of pronotum continued anteriorly along the sides of the front lobe and extending to its front margin* (If interrupted or obsolete along side margins of front lobe then the length of antennal I is greater than width of head thru eyes) 10
 Side margins of anterior lobe of pronotum without evidence of pale lines. Length of antennal I usually less than width of head thru eyes, sometimes subequal. 2
2. Apterous 3
 Macropterous (*celeris*, *genticus*, and *visendus*, unknown in winged form) 8
3. Pronotum produced posteriorly, distinctly longer than broad, differentiated into two lobes. 5
 Pronotum short, broader than long, without evidence of hind lobe. 4
4. Length of first antennal segment subequal to width of head thru eyes. Apex of abdomen not surpassing basal one-fifth of hind femora.
hesione (Kirk.), p. 211
 Length of first antennal scarcely greater than width of vertex plus one eye. Abdomen much longer, extending to basal one-third of hind femora.
visendus, sp. nov., p. 215
5. Pronotum reaching to metanotum, almost or completely covering mesonotum. 6
 Pronotum reaching to middle of mesonotum. 7
6. First genital segment above narrow, tapering posteriorly, the apical margin not or scarcely notched at middle. *lubricus* White, p. 212
 First genital segment above very broad, the sides almost parallel, the hind margin deeply notched at the middle (Pl. XXV, fig. a)
celeris, sp. nov., p. 214
7. Larger, (male) 5.6 mm., (female) 6.7 mm. Eyes as seen from the side almost spherical, not longer than deep. *lotus* White, p. 213
 Smaller, (male) 4.15 mm. Eyes as seen from the side flattened, plainly longer than deep. *genticus*, sp. nov., p. 213

*In some specimens the pale markings are reduced to a small spot behind each eye.

8. Eyes globose, not longer than deep. Pronotum strongly constricted at the sides between the two lobes. Front femora with an oval blackish spot on the outer (posterior) surface before apical third. *lotus* White, p. 213
 Eyes longer than deep. Pronotum less strongly constricted at the sides. Front femora almost entirely blackish along distal half of posterior surface . . .
9. Antennal segments I and II, except apices, brownish. *lubricus* White, p. 212
 Antennal segments I and II entirely fuscous to black. Male genital segments as in Pl. XXIV, fig. *d.* *hesione* (Kirk.), p. 211
10. Antennal segment I less than width of head thru eyes. Mesopleura broadly marked with reddish or russet brown along the upper sides. *ignotus*, sp. nov., p. 205
 Antennal segment I equal to or greater than width of head thru eyes. Mesopleura above next to pronotal margins brown to black, sometimes interrupted with yellowish or silvery. 11
11. Male. 12
 Female. 17
12. First genital segment beneath produced at apex. 14
 First genital segment beneath not produced at apex. 13
13. Metasternum distinctly swollen. First genital segment beneath slightly impressed on each side. *guerini* (L. & S.), p. 206
 Metasternum flat, not swollen. First genital segment beneath distinctly constricted across the middle, broader than distance between apices of connexiva. *profugus* D. & H., p. 209
14. First genital segment beneath with a tumid, almost hemispherical gibbosity, the apex produced at the middle into a prominent recurved spine (Pl. XXIV, fig. *k*). *recurvus* D. & H., p. 210
 First genital segment not as above. 15
15. First genital segment beneath raised into an enormous keel, this greatly produced so that it extends as far posteriorly as does the dorsal part of the segment (Pl. XXV, fig. *b*). *hyalinus* (Fabr.), p. 208
 First genital segment not as above. 16
16. Apex of first genital segment beneath produced at the middle into a short obliquely projecting point (Pl. XXV, fig. *c*). Mesosternum plump. *recens*, sp. nov., p. 207
 Apex of first genital segment beneath produced into a short, recurved tooth. Mesosternum broadly, shallowly impressed. *aduncus* D. & H., p. 209
17. Connexivum truncate at apex, not produced beyond corresponding abdominal tergite. *hyalinus* (Fabr.), p. 208
 Connexivum more or less produced at apex, extending beyond last abdominal tergite. 18
18. Last segment of venter rather sharply produced at the middle behind. Connexival spines moderately long (Pl. XXIV, fig. *l*). *aduncus* D. & H., p. 209
 Last segment of venter more broadly rounded behind. Connexivum not so strongly produced apically. 19

19. Upper portion of mesopleura largely reddish brown, this not divided by a paler longitudinal stripe. Genital segments as in Pl. XXIV, fig. *j*.

recurvus D. & H., p. 210

Upper portion of mesopleura black, this divided by a more or less broad yellowish to silvery stripe..... 20

20. Last venter more strongly produced, the central portion extending slightly farther posteriorly than the connexival processes. The yellowish brown stripe of mesopleura expanded, arched above, broader than the black.

profugus, D. & H., p. 209

Last segment of venter only slightly produced behind. Yellowish brown stripe of mesopleura narrower, its sides practically parallel..... 21

21. Connexivum above with a broad, uninterrupted longitudinal yellowish brown stripe..... *guerini* (L. & S.), p. 206

Connexivum above with three to five large silvery to yellowish brown spots, these sometimes more or less connected..... *recens*, sp. nov., p. 207

1. *Limnogonus ignotus*, sp. nov.

Winged form: Form, size and facies very similar to *L. guerini*; coloration also quite similar but differing in having a broad, reddish brown stripe along the entire length of the upper margin of each side of thorax. Pronotum black, shiny, the anterior lobe depressed on the disc, with a very short brownish stripe on each side of median line, and only slight indications of median carina, the antero-lateral margins with a flavous stripe; posterior lobe margined with flavous. Head with a broad longitudinal yellowish stripe on each side between the eyes, sometimes each of these divided by a narrow blackish line. Rostrum reaching upon mesosternum, black at apex. Antennæ brown, the last two segments darker; proportions—(male) 70:41:41:65, (female) 75:50:48:73. Hemelytra brownish black, the nervures raised and prominent. Anterior femora faintly curved, slightly incrassate, paler at the base. Middle and hind legs dark brownish black. Body beneath whitish testaceous, the venter sometimes embrowned; sides of mesopleura largely black, the upper margin of sides of entire thorax broadly margined with reddish brown; venter with a black stripe on each side.

♂. Sixth venter very broadly, deeply, roundly emarginate behind at the middle, a little longer than the preceding segment. First genital segment large, slightly impressed on each side near the middle, the apical margin subtruncate. Connexiva terminating in very short, triangular processes.

♀. Sixth venter about twice as long as the preceding segment, the apical margin deeply, roundly, broadly emarginate on each side, thus leaving the middle faintly produced. Connexiva terminating in acute black spines. First genital segment impressed on each side.

Size: Length, 6.50-9.40 mm.; width, 1.40-1.80 mm.

Holotype, winged male, and *allotype*, winged female, Villa Rica, Paraguay, S. A., February 21, 1923, collected by F. Schade; in collection of the University of Kansas. *Paratypes*, males and females, taken with types; also from Santa Cruz, Bolivia, J. Steinbach; British Guiana, near New Amsterdam, F. X. Williams; Nalique, Matto Grossa, Brazil, Manizer; Misiones, Loreto, Argentina, A. Ogloblin; in collections of University of Kansas, Petrograd Museum and the writers. In the apterous female the pronotum covers the mesonotum, and the connexiva are broad and have a broad submarginal flavous line.

Very common and widely distributed in South America. Although closely allied to *L. guerini* (L. & S.), it is easily recognizable by the broad reddish brown stripe along upper margins of sides of thorax, the longer, more acute connexival spines in the female, and the slightly differently formed genital segments in the male. The broad stripe along each side of the thorax is fairly prominent.

2. ***Limnogonus guerini*** (Lethierry & Severin) (Pl. XXIV, fig. e)

Gerris marginatus Guérin, Icon. Regne Anim., Ins., 1844, p. 351, Pl. 57, fig. 2;

Guérin, in Ramon de la Sagra's Hist. fis., polit. y nat. de Cuba, Ins., 1857, p. 415.

Limnometra marginata Uhler, Proc. Zool. Soc. Lond., 1893, p. 706; 1894, p. 212.

Gerris guerini, Lethierry and Severin, Cat. Gén. Hémipt., III, 1896, p. 61.

Limnogonus marginatus Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 152.

Limnogonus guerini Kirkaldy & Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 210; Drake and Harris, Psyche, XXXIX, 1933, p. 109.

Form, color and markings very similar to *L. hyalinus* Fabr. Size very variable. Antennæ and legs considerably longer in the larger specimens, but the relative proportions of antennal segments remain approximately the same; antennal formula—(small individuals) 65:46:45:60, (large specimens) 95:62:55:72. Rostrum shorter than in *hyalinus*.

♂. Genitalia as in Pl. XXIV, fig. e. Connexivum moderately narrow, slightly produced at apex.

♀. Connexiva broader than in male, angulate and slightly more produced at apex.

Apterous form: Smaller than the winged form, the posterior lobe of pronotum a little narrower and more sharply rounded at apex than in *recens*.

Size: Length, 5.00-8.71 mm.; width, .90-1.80 mm.

The commonest and most widely disseminated member of the genus in the West Indies, Central America, and Mexico, also extending north into southern parts of Texas and California. As pointed out elsewhere,

the writers believe that this species is the form from California described by Stål (Freg. Eugen. Resa, Ins., 1859, p. 265) as *Gerris franciscanus*. If this be true the name *franciscanus* will have priority. *Guerini* exhibits great variation in size and length of appendages, also much more variation in color and markings than its congeners.

3. *Limnogonus recens*, sp. nov. (Pl. XXV, fig. c)

Limnogonus hyalinus Champion, Biol. Centr.-Amer., Rhyn. II, 1898, p. 153, Pl.

IX, fig. 18; Torre-Bueno, Trans. Am. Ent. Soc., XXVII, 1911, p. 245.

Tenagogonus hyalinus Drake and Harris, Ohio Jour. Sci., 1928, XXV, p. 273.

Apterous form: Moderately large, black, shiny, the head with two longitudinal vittæ united posteriorly to form a yoke-like mark, two short stripes on front lobe of pronotum, a narrow median stripe on the margins of posterior lobe and a short stripe on the antero-lateral margins flavous to ochraceous. Antennæ brownish black; proportions—(male) 90:75:62:84, (female) 88:65:52:80. Rostrum moderately long, last segment black, not quite extending to middle of mesosternum. Pronotum with the anterior lobe slightly raised in male, the posterior lobe extending upon metanotum in both sexes, broadly rounded behind. Fore femora slightly incrassate, faintly curved; the tibiæ darkened at apex; tarsi blackish. Body beneath testaceous.

Winged form: Markings as in apterous individuals. Humeri moderately prominent. Hemelytra blackish, brownish along the inner margin, the nervures prominent.

♂. Intermediate and posterior acetabula above silvery. Abdomen above with a median brownish stripe. Connexiva moderately broad, narrow but not produced at apex, the third, fourth and sometimes fifth segment with a silvery or brown spot. Venter with last segment nearly as broad as two preceding, arcuately emarginate at apex. First genital segment beneath conspicuously raised and strongly produced at the middle behind, terminating in a point (Pl. XXV, fig. c).

♀. Connexiva broader, usually with brownish spots on all but first and last segments, terminating behind in short sharp processes. Last segment of venter about as long as the two preceding, slightly produced at the middle.

Size: Length, 7.50-10.00 mm.; width, 1.40-2.10 mm.

Holotype, apterous male, and *allotype*, apterous female, Punta Gorda, British Honduras, in collection of the authors. *Paratypes*, numerous apterous and winged males and females, taken with types, and from Los Amates, Guatemala and from Panama City, Panama. Heretofore, this species has been considered by the writers and most other American workers as *L. hyalinus* Fabr. The latter, however, is quite different, having a much larger and more strongly produced

keel beneath on the first genital segment of the male. We are indebted to Dr. H. B. Hungerford of the University of Kansas for a sketch of the genitalia of the type of *hyalinus*, and to Mr. W. E. China of the British Museum of Natural History for the privilege of examining the specimens, from Panama, figured by Champion as *L. hyalinus* Fabr. The outline drawings of the lateral aspect will serve to separate the two species.

4. ***Limnognonus hyalinus* (Fabr.)** (Pl. XXV, fig. *b*)

Hydrometra hyalinus Fabricius, Syst. Rhyng., 1803, p. 258.

Limnognonus hyalinus Stål, Hemip. Fabr., I, 1868, p. 133.

Apterous male: Large, robust, brownish black, the abdomen darker; the sides of the acetabula and the connexivum above in a large measure clothed with silvery pubescence. Head with a longitudinal line on each side above and a basal transverse streak brown. Rostrum brownish testaceous, black at apex, reaching to the front third of the mesosternum. Antennæ dark brown, the basal segment a little lighter; proportions, 90:75:58:78. Pronotum brownish black, anterior lobe tumid, its disc depressed and with two short reddish brown stripes; posterior lobe very strongly produced, extending over part of metanotum, with the median longitudinal streak extending upon the basal portion of anterior lobe, the margins flavous. Abdomen above with a median rufous line on last five segments. Connexiva moderately broad, triangularly produced at apices. Body beneath testaceous. Mesosternum broadly channeled in front. Front legs brownish, the base of femora, coxæ and trochanters testaceous; femora moderately incrassate, slightly curved. Venter somewhat flattened beneath, the last segment about as long as the two preceding, subtruncate behind, with a broad blackish streak on each side. Sides of thorax above and intermediate acetabula dark reddish brown. First genital segment beneath very strongly produced and tapering posteriorly, the apical plate darkened, flattened, and abruptly bent downward (Pl. XXV, fig. *b*); above broad, blackish, constricted at the base, with a short median basal streak and part of the hind margin brownish. Second genital segment short, broad and plump.

Size: Length, 8.65 mm.; width, 1.70 mm.

Panama, Trinidad, French Guiana, Brazil, and Ecuador. Male specimens from Trinidad are at hand. The writers are greatly indebted to Dr. H. B. Hungerford for a sketch of last venter and genital segments and also descriptive notes of the Fabrician type, without which it would have been impossible to locate the species. Heretofore, *L. recens*, sp. nov, has been wrongly identified by the writers, Torre-Bueno and others as *L. hyalinus*. The Florida record of *hyalinus*

probably represents an erroneous identification. The species is easily known by the genital characters of the male. In one of the specimens at hand the terminal, downwardly bent tip of the plate at the apex of the first genital segment is broken off.

5. *Limnogonus profugus* Drake and Harris

Limnogonus profugus Drake and Harris, Ann. Carn. Museum, XIX, 1930, p. 237.

Allied to *recurvus* D. & H. in size, color, and markings, but readily distinguished from it by the structure of sixth venter and genital segments. Antennæ brown to dark brown, the last segment darker; proportions—(male) 98:70:72:82, (female) 95:66:58:80. Rostrum with last segment black, extending upon mesosternum.

Apterous form: Pronotum reddish brown; the anterior lobe considerably raised in male, scarcely elevated in female, blackish, with two short ochraceous stripes on the disc, the antero-lateral margins with a flavous line on each side; posterior lobe extending to metanotum, with a median longitudinal line and the margins flavous. Sides of thorax with broad blackish stripe, beneath clothed with grayish pubescence; acetabula above silvery pubescent.

Winged form: Pronotum darker, humeri moderately prominent; anterior lobe depressed on the disc. Hemelytra blackish, nervures prominent and darker.

♂. Sixth venter very deeply, broadly and roundly emarginate behind. First genital segment plump, without keel, transversely impressed near the base.

♀. Sixth venter broadly convex at the middle behind, shorter than the two preceding segments. Connexiva scarcely produced apically.

Size: Length, 7.50-10.60 mm.; width, 1.60-2.00 mm.

Holotype, winged male, and *allotype*, winged female, from Chapada, Brazil, H. H. Smith, are in the Carnegie Museum. Numerous other specimens have been seen from Brazil and Paraguay.

The series show that there is considerable range in size, and variations in color markings, and in lengths of antennal segments. In some examples the sides of the thorax tend to be much darker than in others. The sixth venter in the female is not as acutely produced at the middle behind as in *L. aduncus*, neither are the terminal connexival spines as long nor as acute.

6. *Limnogonus aduncus* Drake and Harris (Pl. XXIV, fig. 1)

Limnogonus aduncus Drake and Harris, Psyche, XXXIX, 1933, p. 110.

Apterous ♂. Size and general aspect similar to *Limnogonus recurvus* D. & H., the head and pronotum with similar markings.

Antennæ dark brown; proportions, 104:88:68:87. Rostrum dark brown, the apical segment blackish, reaching upon the anterior portion of mesosternum. Front legs dark brown. Pronotum black, indistinctly margined with fulvous; anterior lobe moderately tumid, with two short ochraceous lines on the disc; posterior lobe broadly rounded behind, extending upon base of metanotum, with a median ochraceous line. Abdomen above with a median longitudinal ochraceous line. Body beneath yellowish brown with grayish pubescence, the mesosternum large, the venter sometimes with a broad, blackish, submarginal stripe.

Connexivum moderately broad, slightly produced at apex, segments two, three, and four each with a prominent pale or silvery spot. Venter somewhat flattened, hairy along posterior margin, the last segment almost twice as long as the preceding. Genital segments large, dark brown, the first segment impressed on each side of a median raised portion which becomes narrowed posteriorly and ends in a distinct brownish black recurved or hook-like projection.

Apterous ♀. Broader and stouter than male, brownish black. Finely pubescent, the sides of pronotum, the intermediate and posterior acetabula, and second and third segments of connexivum silvery. Antennæ brownish; proportions, 108:80:70:95. Abdomen above with a broad, median, longitudinal flavous to fulvous stripe. Connexiva distinctly, angularly produced behind; sixth venter nearly twice as long as preceding, its hind margin more sharply concavely produced at the middle than in *profugus* (Pl. XXIV, fig. *l*).

Winged form: Pronotum with the humeri raised and prominent, the anterior lobe depressed on the disc, with two short fulvous stripes. Hemelytra brownish black, reaching beyond tip of abdomen.

Size: Length, 8.00-11.30 mm.; width, 1.60-2.40 mm.

Originally described from three specimens from Brazil, Comparative Zoology Museum, Harvard University. In addition a long series of specimens from Trinidad, British Guiana, Ecuador, Paraguay, and Brazil have been examined. These exhibit considerable variation in size and some differences in the lengths of the antennal segments. The antero-lateral stripe of the pronotum may or may not be developed, often being reduced to a small spot behind each eye. In the male the mesosternum is broadly and shallowly depressed, there clothed with longer pile.

7. *Limnogonus recurvus* Drake and Harris (Pl. XXIV, figs. *j* and *k*)

Limnogonus recurvus Drake and Harris, Ann. Carn. Mus., XIX, 1930, p. 236.

Apterous form: Fuscous to blackish, a line on each side of head above near the eyes, these connected at base of head, two short stripes on disc of anterior lobe of pronotum, a medium stripe and

margins of posterior lobe yellowish to ochraceous. Antero-lateral margins of pronotum with a yellowish to silvery stripe. All acetabula and the middle and hind coxæ, dark brown, with silvery pubescence. Second, third, and fourth segments of connexiva and sometimes the sides of abdomen above with silvery pubescence. Body beneath yellowish testaceous, the sides of thorax brownish to blackish, sides of venter with a broad, brownish black to black vitta.

♂. Antennæ brownish fuscous, the terminal segments darker; formula, 100:74:56:82. Connexiva broad, angularly produced behind. The median longitudinal stripe on the dorsum extending to last genital segment. Posterior portion of mesosternum and the metasternum broadly depressed, clothed with longer pile. Last venter truncate, about as long as the two preceding segments conjoined. First genital segment strongly produced at the apex, terminating in a dark brown, recurved hook, with a large, rounded protuberance in front of the hook (Pl. XXIV, fig. *k*).

♀. Antennal formula, 100:66:55:85. Sixth venter nearly as long as the two preceding, convexly produced at the middle behind (Pl. XXIV, fig. *j*). Fifth venter sinuate along the hind margin. Connexiva broadly angularly produced behind. Metasternum shallowly sulcate in front.

Size: Length, 9.16 mm.; width, 1.60-1.90 mm.

Known only from the type locality, Chapada, Brazil. The winged form is unknown. The male genital characters are very different from those of any other species in the genus.

8. *Limnogonus hesione* (Kirkaldy) (Pl. XXIV, fig. *d*)

Gerris hesione Kirkaldy, Entomologist, XXXV, 1902, p. 137.

Tenagogonus hesione Barber, Bull. Am. Mus. Nat. Hist., XXXIII, 1914, p. 499;

Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 273.

Limnogonus hesione Osborn and Drake, Ohio Nat., XV, 1915, p. 503, fig. 1; Blatchley, Heteroptera E. N. Amer., 1928, p. 179, fig. 194.

Black, a transverse spot on base of head, the margin of hind prolongation of pronotum, and a spot on anterior lobe flavous to fulvous. Pronotum indistinctly carinate, the humeri prominent. Abdomen rather short, somewhat abbreviated. Body beneath with a silvery bloom. Hemelytra brownish black, reaching considerably beyond tip of abdomen; nervures prominent. Antennal proportions, 64:36:38:39.

Apterous form: Oblong-oval, moderately robust. Pronotum short, with an elongate median fulvous spot; slightly produced posteriorly in male; hind lobe a little more strongly developed in female, covering a small fraction of the front portion of mesonotum. Mesonotum large, strongly convex. Connexiva in male rather narrow, not produced at apex; in female very broad, truncate behind.

♂. Genital segments as in Pl. XXIV, fig. *d*.

♀. Sixth venter about as long as two preceding segments.

Size: Length, 4.50-7.92 mm.; width, 1.40-1.80 mm.

Widely distributed in Eastern United States, and largely found in ponds and lakes. Specimens have been examined from New York, Ohio, Michigan, Kansas, West Virginia, Georgia, Florida, Alabama, Mississippi, Louisiana, Missouri, Iowa, Illinois, Nebraska, Texas, Tennessee, Arkansas, Virginia, Pennsylvania, Kentucky, Indiana, and South Carolina. Kirkaldy's types from Florida and Panama are in U. S. National Museum. The winged form is quite common in the south and rather rare in the north.

9. *Limnogonus lubricus* White.

Limnogonus lubricus White, Jour. Linn. Soc. Lond., Zool., XIV, 1879, p. 489;
Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 210.

Apterous form: Very small, black; a spot on disc of anterior lobe of pronotum and margin of posterior lobe ochraceous. A broad stripe on side of thorax, acetabula, most of abdomen above, and body beneath rather silvery. Antennæ brown, the apices of first and second segments and all of third and fourth blackish; proportions—(male) 46:26:27:36, (female) 52:32:32:38. Anterior legs dark brown, the trochanters and base of femora lighter. Mesosternum channeled anteriorly. Prosternum yellowish. Body widest through acetabula of middle legs, thence narrowed anteriorly and more strongly so posteriorly. Sides of thorax blackish above. Anterior tibiæ slightly curved, the tarsi black. Posterior lobe of pronotum covering the mesonotum.

♂. Sixth venter nearly as long as the two preceding, slightly emarginate behind. First genital segment narrowed posteriorly, beneath distinctly transversely impressed on each side. Connexiva rounded above, narrowed posteriorly, not produced behind. Second genital segment, as seen from above, small, narrowed toward tip.

♀. Abdomen broader and longer than in male, connexiva much broader, truncate behind. Last venter very long, as long as the two preceding segments, slightly convex apically.

Winged form: Pronotum with an indistinct median carina on posterior lobe; humeri moderately prominent. Hemelytra dark brown, the nervures raised and slightly darker.

Size: Length, 3.50-5.10 mm.; width, 1.30.

This is the smallest member of the genus known to occur in the Western Hemisphere. As in the other species with abbreviated abdomen, winged individuals are considerably longer than apterous ones. Many specimens have been examined from Brazil, British Guiana and Dutch Guiana. Identification is based on a pair of paratypes kindly loaned the writers by Mr. W. E. China of the British Museum.

10. *Limnogonus lotus* White

Limnogonus lotus White, Jour. Linn. Soc. Lond., Zool., XIV, 1879, p. 488; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 210; Drake and Harris, Ann. Carnegie Mus., XIX, 1930, p. 236.

Apterous form: Rather small, black, basal margin of head, a spot on disc of anterior lobe of pronotum and the margin of hind lobe ochraceous. Sometimes head with more or less distinct longitudinal lines. Silvery pubescence not as conspicuous as in *lubricus*. Anterior lobe of pronotum prominent, distinctly marked off, the posterior lobe extending a little beyond middle of mesonotum. Antennal proportions, (female) 60:41:32:43. Anterior legs yellowish brown, a large dark spot on the femora behind and the tibiæ and tarsi blackish; femora short, much stouter than in related species. Mesonotum raised, tumid.

♂. Last venter about two-thirds as long as the two preceding segments together, the apex feebly, broadly, roundly, excavated behind. First genital segment indistinctly impressed on each side. Connexivum narrowed posteriorly. First genital segment above slightly concave, subtruncate at the apex, the second small and narrowed to the tip.

♀. Much broader than the male, also much broader than female of *lubricus*, practically as broad as *celeris*, sp. nov. Last dorsum almost as long as the two preceding but not so strongly narrowed posteriorly as in *celeris*. Sixth venter nearly as long as the two preceding, the hind margin faintly sinuate.

Winged form: Anterior lobe of pronotum also more prominent than in related species. Hemelytra brown, the nervures raised and darker.

Size: Length, 5.60-6.70 mm.; width, 1.20-1.85 mm.

Specimens from British Guiana and Brazil, including a pair of paratypes have been examined. The species is probably most closely allied to *celeris*, sp. nov.

11. *Limnogonus genticus*, sp. nov.

Apterous ♂. Small, black, shiny. Head black, margined with ochraceous behind. Antennæ brown, the apex of first and second and all of last two segments blackish; proportions, 45:22:22:33. Body beneath bluish, the sides of thorax above blackish. Front legs blackish, the basal portion of femora and trochanter testaceous; tibiæ slightly curved, the femora stout. Rostrum reaching a little beyond the prosternum, bluish brown, dark at apex. Sixth venter about two-thirds as long as the two preceding segments conjoined, slightly, broadly, roundly excavated behind. Connexivum narrowed posteriorly, not produced behind, without markings. Middle and hind legs brownish. First genital segment beneath tapering pos-

teriorly, slightly transversely depressed at the base, broadly and shallowly excavated behind; above rounded behind as in *lubricus* White. Second segment narrowed toward tip. Abdomen narrowed apically. Pronotum with the front lobe slightly raised, faintly depressed on the disc, there with a large ochraceous spot; posterior lobe largely margined with yellowish brown, rounded behind, extending to middle of mesonotum. Mesonotum tumid, slightly raised posteriorly, with an indistinct median impressed line.

Size: Length, 4.15 mm.; width, 1.20 mm.

Holotype, apterous male, Santarem, Brazil, collection of authors. The size and the nature of the pronotum serve to distinguish this insect from related species. The winged form is unknown.

12. *Limnogonus celeris*, sp. nov. (Pl. XXV, fig. a)

Apterous form: Small, a little larger than *lubricus* White. Black, a spot on base of head, an oblong spot on disc of anterior lobe of pronotum, and entire border of posterior lobe flavous to ferruginous. Antennæ dark brown, segments I and II except tips paler; proportions—(male) 50:31:26:37, (female) 58:38:33:42. Anterior legs testaceous, a short stripe on apical half of femora, and entire tibiæ and tarsi blackish. Rostrum testaceous, the tip blackish, extending on front portion of mesosternum. Posterior legs brownish testaceous, the tarsi darker. Sides of mesothorax black. Mesosternum narrowly channeled in front.

♂. Anterior lobe of pronotum moderately tumid, the disc distinctly impressed; posterior lobe covering the mesonotum, narrower than in female. Connexivum scarcely produced at the apex. Body beneath largely bluish, the prosternum and anterior portion of mesosternum testaceous. Last venter subtruncate, shorter than the two preceding segments together, mostly brownish. First genital segment above rather deeply emarginate at apex, about twice as broad as in *lubricus* and slightly narrower than in *lotus*; testaceous to bluish gray beneath, with a narrow transverse impression on each side (Pl. XXV, fig. a). Last genital segment beneath plump; above very narrow and pointed at tip.

♀. Broad, as in *lotus*. Pronotum impressed on the disc of front lobe, the posterior lobe extending over mesonotum. Abdomen very broad, the connexiva somewhat rounded at the apex. Body beneath largely testaceous, a large spot on basal portion of meso- and metasternum, and narrow interrupted spots on the venter dark brown. Last segment of venter almost as long as the two preceding ones together, subtruncate behind.

Size: Length, 5.00-5.70 mm.; width, 1.00-1.20 mm.

Holotype, apterous male, and *allotype*, apterous female, Villa Rica, Estero Grande, Paraguay, Feb. 1, 1924, F. Schade; collection of University of Kansas. *Paratypes*, two males and one female taken with

type. The notch at the apex of the first genital segment serves readily to identify the male.

13. *Limnogonus visendus*, sp. nov.

Apterous form: Moderately large, slender; black, a spot on disc of pronotum and a broad yoke-like mark on head above ochraceous to ferruginous. Antennæ brownish black, the first segment, except apex, paler; proportions, 45:26:26:32. Rostrum reaching on front portion of mesosternum, segment II and III very dark and shiny. Pronotum short, not produced posteriorly, impressed on disc. Mesonotum sharply delineated, moderately tumid, highest behind the middle, rounded behind. Anterior femora moderately bowed, the distal three-fourths blackish; tibia curved, dark brown; tarsi darker. Body beneath clothed with a dense bluish pile; the sternum and venter flattened. Middle and hind legs dark brown, the tips of femora darker. A spot on middle and hind acetabula and one on each side of fourth, fifth, and sixth abdominal tergites and also corresponding connexival segments silvery.

♂. Abdomen truncate behind. Connexiva not produced at apex. Venter slightly flattened, the sixth segment a little longer than preceding, broadly roundly emarginate behind. First genital segment above rather long, sub-cylindrical, truncate behind; second segment short, coniform; beneath, first segment transversely impressed at the base, the hind margin roundly emarginate, the second segment with a distinct tuft of pale hairs on each side.

♀. Slightly more robust than male, the connexiva not produced behind.

Size: Length, 5.00-5.40 mm.; width, 1.20 mm.

Holotype, apterous male, and *allotype*, apterous female, Rio Branco (Brazil), Haseman; in collection of Vienna Museum. *Paratype*, male, in authors' collection.

This species is easily recognized from its congeners. The body is only moderately shiny and the abdomen is noticeably long for the group of species to which it belongs.

III. Genus TENAGOGONUS Stål, 1855

Haplotype, *albovittatus* Stål

Tenagogonus Stål, Öfv. Vet.-Akad. Förh., X, 1853, p. 263 (*nomen nudum*); Stål, *ibid.*, XII, 1855, p. 45; Stål, Hemip. Afr., III, 1865, p. 168; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 209; Bergroth, Zool. Med. Rijks. Mus. Nat. Hist., I, 1915, p. 123.

Limnometra Mayr, Verh. Zool. Bot. Ges. Wien., XV, 1865, p. 443; Mayr, Reise Freg. Novara, Zool., II, 1868, p. 175; Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 150.

Moderately elongate, dull, finely pubescent. Antennæ long, slender, about as long as or slightly longer than the entire body; segments I and II moderately stout, III and IV filiform, IV longest. Eyes exerted. Rostrum long. Anterior tarsal segments subequal in length. Intermediate and posterior legs very long, their femora extending far beyond the apex of abdomen.

Three species of water striders occurring in the Western Hemisphere are referable to this genus. In all, the middle and posterior acetabula as seen from above are marked with conspicuous, silvery sericeous spots. Only winged forms are known for the described American species; however, Champion recorded one wingless specimen (species uncertain) from Central America.

KEY TO SPECIES OF *Tenagonus*

1. Head and front lobe of pronotum with prominent black markings. Length of antennal segment I slightly greater than width of head thru eyes. Sixth venter deeply notched at middle behind in male (Pl. XXIV, fig. *g*); broadly convexly rounded in female. *quadrilineatus* (Champ.), p. 216
 Head and pronotum in front not or only indistinctly marked with darker lines, these never black. Antennal segment I in length equal to width of head thru eyes. Sixth venter at apex not distinctly notched in middle in male; subangulately or subquadrately produced in female. 2
2. Male with prominent tubercule on inner side of front femur before base. Genital segments of male as in Pl. XXIV, fig. *i*; sixth venter subquadrately produced at apex in female (Pl. XXIV, fig. *h*) *celocis* D. & H., p. 218
 Front femur of male not tuberculate. Genital segment of male as in Pl. XXIV, fig. *f*; female with apex of venter distinctly, subacutely, produced in middle at apex. *opacus* (Champ.), p. 217

1. *Tenagonus quadrilineatus* (Champion) (Pl. XXIV, fig. *g*)

Limnometra quadrilineata Champion, Biol. Centr.-Amer., Rhynch., II, 1898, pp. 150, 151, pl. IX, fig. 17.

Tenagonus quadrilineatus Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., 1908, p. 209; Drake and Harris, Ohio Jour. Sci., XXVIII, 1928, p. 273.

Moderately narrow, opaque, head fulvous to ochraceous, with black markings. Rostrum reaching to front third of mesosternum. Antennæ dark brown; proportions—(male) 73:52:80:95, (female) 86:60:80:95. Anterior lobe of pronotum concolorous with head, with four blackish stripes; posterior lobe usually much darker, obsoletely carinate down the middle. Hemelytra fuscous black. Mesosternum with broad median channel.

♂. Metasternum with a very prominent median carina. Connexiva not produced at apex. Sixth venter very strongly impressed behind, broadly, deeply, and roundly emarginate in middle at apex (Pl. XXIV, fig. *g*).

♀. Connexiva terminating in moderately long spines. Sixth venter very strongly, broadly, and roundly produced behind, as long as the two preceding segments, usually concealing the genital segments.

Size: Length, 6.20-11.00 mm.; width, 2.00-2.80 mm.

Recorded from Mexico and Nicaragua by Champion. Specimens have been seen from Paraguay, Costa Rica, Honduras, Guatemala, and Mexico. There is quite a range in size and considerable variation in color markings and in the length of the antennæ in both sexes. Two forms of macropterous individuals occur in *quadrilineatus*, one with hemelytra reaching beyond the tip of abdomen and the other with them considerably shorter, not attaining the apex of the last dorsum. The structure of the sixth venter, together with the nigro-lineate head and pronotum are quite distinctive characters.

2. *Tenagogonus opacus* (Champion) (Pl. XXIV, fig. f)

Limnometra opaca Champion, Biol. Centr.-Amer., Rhynch., II, p. 150, Pl. IX, 1898, figs. 16, 16a.

Tenagogonus opacus Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 209.

Rather narrow, opaque, brownish ferruginous above, pale ochraceous beneath. Head with a streak on each side between the eyes and a spot in front dark brown to black. Antennæ very slender, dark brown, the basal segment curved; formula—(male) 65:48:92:115, (female) 75:58:92:125. Pronotum reddish brown, with a fairly distinct median carina, anterior lobe with a more or less distinct, posteriorly-narrowed, median, pallid line, the antero-lateral margins with a pale testaceous stripe; posterior lobe darker. Rostrum reaching almost to middle of mesosternum. Mesosternum more broadly and deeply channelled along the middle anteriorly.

♂. Connexiva not terminating in spines. Metasternum with a very distinct median carina. Sixth venter a little longer than the preceding, very broadly and roundly emarginate behind (Pl. XXIV, fig. f). Median line on anterior lobe of pronotum sometimes obsolete.

♀. Connexiva terminating in short, stout spines. Sixth venter almost as long as the two preceding, subacutely produced in the middle at apex. Posterior margin of pronotum much more broadly rounded behind than in male.

Size: Length, 6.00-9.10 mm.; width, 1.75-2.30 mm.

Described by Champion from specimens from Panama. In addition to a male cotype from Bugaba, the writers have examined numerous specimens from Guatemala, Costa Rica, Nicaragua, British Honduras, and Panama. In this and the following species the submarginal groove of the hind lobe of the pronotum is densely filled with golden pubescence.

3. *Tenagogonus celocis* Drake and Harris (Pl. XXIV, figs. *h* and *i*)

Tenagogonus opacus Drake & Harris, Ann. Carn. Mus., XIX, 1930, 235.

Tenagogonus celocis Drake & Harris, *ibid.*, XX, 1931, 267.

Similar to *opacus* Champ. in size, general color and markings, but with the silvery spots on the antecoxal plates more prominent. Antennal proportions—(male) 70:50:90:115, (female) 76:57:80:170. Rostrum reaching to about the middle of mesosternum. Hemelytra dark brown, the nervures prominent. Antero-lateral margins of pronotum with a pale stripe. Mesosternum with median longitudinal channel; the metasternal carina only moderately prominent.

♂. Anterior femora slender, strongly curved, distinctly carinate within on the basal third, the carina becoming more strongly raised distally and there terminating abruptly to form a conspicuous elevation. Sixth venter as long as the two preceding segments, slightly longer than in *opacus*, and much shorter than in *4-lineatus*, very broadly, roundly excavated behind (Pl. XXIV, fig. *i*).

♀. Much larger and stouter than male. Front femora slightly curved, unarmed. Connexiva terminating in short, strong spines. Sixth venter nearly twice as long as the preceding segment, strongly, subquadrately produced at the middle behind.

Size: Length, 6.30-8.10 mm.; width, 1.80-2.54 mm.

The *holotype* (male) and *allotype* (female) from Chapada, Brazil, H. H. Smith, are in the Carnegie Museum. Readily distinguished from its congeners by the anterior femora in the male and the hind margins of sixth venter in the female. This is the only American member of the genus having the anterior femora armed in the male.

IV. Genus CYLINDROSTETHUS Mayr, 1865

Haplotype, *fieberi* Mayr, 1865 (= *producta* Spinola, 1840)

Hydrobates Erichson, in Schomburgk's Faun. Brit. Guiana, III, 1848, p. 614 (*nec. Boie*).

Cylindrostethus Fieber, Europ. Hemip., 1861, p. 33 (invalid); Mayr, Verh. Zool. Bot. Ges. Wein., XV, 1865, 444; Kirkaldy, Entomologist, XXX, 1897, 258; Bergroth, Ent. Mo. Mag., XIII, 1902, p. 258; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 210; Schmidt, Stett. Ent. Zeit., 76, 1915, p. 361; Torre-Bueno, Spolia Zeylandica, 13, 1925, p. 226.

Janias Distant, Fauna Br. Ind., Rhynch., V, 1910, p. 148; Esaki, Ann. Mag. Nat. Hist., (10) 4, 1929, p. 416.

Body very elongate, cylindrical; antennæ rather slender, moderately long; intermediate and posterior legs extremely long, their femora extending to or even a little beyond the last genital segment; front tarsi with segment II twice as long as I. Rostrum short, not attaining middle of prosternum. Eyes large, long, not exerted, placed obliquely

on the sides of the head. Metasternum divided by a sinuate, transverse suture a little before hind margin. In apterous form pronotum rather short, not produced behind over mesonotum.

This genus is represented in the Western Hemisphere by five species, two of which are described below as new. Winged forms of American species are as yet unknown.

In the exotic *C. quadrivittatus* Bergroth, the male genital segments are asymmetrical, and the femora of the middle and hind legs extend far beyond the tip of the abdomen. In these and other characters it shows decided affinities with *Potamobates* Champion.

KEY TO SPECIES OF *Cylindrostethus*

1. Mesonotum unicolorous, brownish to brownish black, longitudinally impressed along the sides. Sixth venter of male doubly emarginate at apex (with a deep notch at the middle)..... 2
 Mesonotum brownish, with conspicuous fuscous to black longitudinal stripes. Sixth venter of male with a broad simple emargination at apex (without median notch)..... 3
2. Mesonotum dark, fuscous to blackish. Male venter and genital segments as in Pl. XXV, fig. *e*. First genital segment above of female as long as broad, narrowed distally, the apex broadly rounded. ... *erythropus* (H.-S.), p. 219.
 Mesonotum brownish. Male venter and genital segments as in Pl. XXV, fig. *f*.
linearis (Erich.), p. 220
3. Length of first antennal segment subequal to width of head thru eyes.
hungerfordi, sp. nov., p. 221
 Length of first antennal segment distinctly greater than width of head thru eyes..... 4
4. First two antennal segments black. Connexival spines of male reaching to middle of first genital segment. Female with connexival spines long, reflexed, and contiguous above genital segments; first genital above longer than broad, ending in acute point..... *palmaris*, sp. nov., p. 222
 First two antennal segments paler, largely testaceous. Connexival spines shorter, not reaching to middle of first genital segment in male (Pl. XXV, fig. *g*). Female not as above..... *regulus* (White), p. 222

1. *Cylindrostethus erythropus* (Herrich-Schaeffer) (Pl. XXV, fig. *e*)

Hydrometra erythropus Herrich-Schaeffer, Wanz. Ins., IX, 1850, p. 68, fig. 923.

Cylindrostethus erythropus Schmidt, Stett. Ent. Zeit., 76, 1915, p. 362.

Elongate, brownish black to black, the margins of connexiva and sometimes median line of pronotum and part of head above brown; clothed with short, fine, golden pubescence. Antennæ brownish

black; proportions, 92:40:28:50. Mesonotum longitudinally impressed on each side. Abdomen above brownish black. Mesosternum testaceous. Fore femora brownish above, largely brownish black beneath; tibiæ and tarsi blackish. Intermediate and posterior legs brown, the apices of tibiæ and tarsi darker.

♂. Abdomen distinctly widened posteriorly, the connexival spines very stout, extending almost to apex of first genital segment. Venter with the last two or three segments impressed along the middle, the last segment broadly, roundly excavated in the middle at the apex, there forming a deep median notch. First genital segment beneath plump, slightly impressed on each side; above subquadrate, flattened distally, impressed within along the lateral margins posteriorly, convexly rounded behind. Last genital segment above conical, shorter than first, produced on each side into long, strong, triangular projections, which extend almost to the end of first genital segment (Pl. XXV, fig. *e* and *é*).

♀. Connexival spines much shorter than in male, directed posteriorly. Sixth venter subtriangularly produced at middle behind. First genital segment impressed on each side beneath; above broad at base, narrowed posteriorly, truncate at apex. Last genital segment pointed, about as long as the preceding one.

Size: Length, 14.50-15.50 mm.; width, 1.90-2.00 mm.

Type locality, Brazil. In the Kansas University collection there is a series of sixty-seven specimens from Solimoes River, Manacapuru, Amazonas, Brazil, March and April, 1926, collected by S. M. Klages.

2. *Cylindrostethus linearis* (Erichson) (Pl. XXV, fig. *f*)

Hydrobates linearis Erichson, in Schomburgk's Fauna Brit. Guiana, III, 18, p. 614.

♂. Elongate, brownish black, the abdomen slightly widening posteriorly; connexival margins paler, the apical spines shorter and much slenderer than in *erythropus* (H.-S.). Last venter impressed at the base, the apical margin hairy, deeply and roundly excavated at the middle, the median tooth shorter, more strongly reflexed and more inconspicuous than in *erythropus*. First genital segment beneath plump, faintly impressed on each side; above strongly longitudinally impressed on each side of median line behind, thus leaving the lateral margins distinctly raised. Second genital segment above long, slender, cylindrical on basal half, then narrowed and terminating in a point; the ventral antero-laterally projecting plates considerably narrower than in *erythropus* (Pl. XXV, fig. *f*). Antennæ brownish black; proportions, 90:36:26:50.

♀. Very similar to *erythropus*. Connexival spines short. Antennæ darker than in male.

Size: Length, 14.00-15.00 mm.; width, 1.90-2.00 mm.

A male and female each labelled "*H. linearis*, Type, Brit. Guyana, Schomburgk" have been made available for our study through the kindness of Dr. W. Rammé, Zoologisches Museum der Universität, Berlin. A male from Rio Javary, Brazil, 1874, Traile collection, kindly sent for study by Mr. W. E. China of the British Museum, apparently belongs to the same species. *Linearis* is very closely related to *erythropus* H.-S.

3. *Cylindrostethus hungerfordi*, sp. nov.

Brown, somewhat shiny, with blackish markings. Antennæ with first two segments black; proportions, 107:40 (others wanting). Antennal tubercles black. Pronotum depressed in the middle. Mesonotum with a faint, median, longitudinal, depressed line; lateral stripe narrow, fuscous-black, sometimes largely wanting. Metanotum with an elongate blackish spot on each side. Abdomen above black, with a median, brown stripe. Anterior legs moderately large, femora beneath with numerous dark, bristly hairs, above with many blackish setæ near the base; tibiæ slightly curved, mostly black; tarsi black. Middle legs brownish, the femora with a longitudinal stripe on the basal three-fourths above, and a stripe on distal two-thirds beneath black. Hind legs dark brown, the femora above almost black. Body beneath pale brownish.

♂. Connexiva brown, slightly darker along the margin, terminating in short, sharp spines. First genital above cylindrical, about as long as broad; second segment narrow, long, pointed, slightly more than one and a half times as long as the first. Venter with a fairly distinct median keel, sixth segment very deeply, broadly, roundly emarginate behind, its margin clothed with numerous long hairs. First genital segment beneath cylindrical, faintly depressed on each side at the base, there quite hairy.

♀. Connexiva broader than in male, usually somewhat reflexed, terminating in moderately long spines which reach to middle of first genital segment. First genital segment above uniformly narrowed posteriorly; second scarcely longer than the first, ending in a long spine. First genital segment beneath compressed on each side, with short, dark setæ at the apex.

Size: Length, 19.00-22.00 mm.; width, 2.10 mm.

Holotype, apterous male, and *allotype*, apterous female, British Guiana, near New Amsterdam, South America, July 30, 1923, F. X. Williams; collection of University of Kansas. *Paratypes*, two males and two females, taken with types. The species is named in honor of Dr. H. B. Hungerford.

4. *Cylindrostethus palmaris*, sp. nov.

Cylindrostethus linearis Drake and Harris (*nec.* Erichson), Ann. Carn. Mus., XIX, 1930, p. 238.

Size and form similar to *regulus* White. Antennæ black, sometimes (male) the last two segments brownish; proportions, 112:46:32:55. The black stripes on thorax broader than in *regulus*.

♂. Connexiva brown, the terminal spines not quite reaching the middle of first genital segment. Last venter broadly, widely emarginate. First genital segment beneath plump, pilose. Last genital segment above long, pointed, the laterally projecting, plate-like structures small, brown.

♀. Thorax with a broad brownish black stripe along each side; mesonotum in some specimens with a small elongate patch of rather long, suberect, bristly, brown hairs on each side about one-third of the distance from the base. Connexiva greatly thickened and reflexed behind, the apices drawn out into rather long, brown spines which meet at their tips. First genital segment ending above in a short, black-pointed projection, beneath strongly impressed on each side and clothed with more numerous bristly brown hairs than in *regulus*; last segment with the spine fuscous black, long, much longer than in *regulus*.

Size: Length, 16.00-17.00 mm.; width, 2.00 mm.

Holotype, female, and *allotype*, male, Manacapura, Amazonas (Solimoes River) Brazil, June, 1926, S. M. Klages, Carnegie Museum.

Specimens are also at hand from British Guiana (near New Amsterdam), collected July 30, 1923, F. X. Williams; Cedros, Trinidad, B. W. I., August 20, 1921, collected by Aug. Busck; and Brazanca, Para, Brazil, Dec. 29, 1909. *Paratypes* in collections of University of Kansas, U. S. National Museum, Berlin Museum, and authors.

5. *Cylindrostethus regulus* (White) (Pl. XXV, fig. g)

Halobates regulus White, Journ. Linn. Soc. London, Zool., XIV, 1879, p. 488.

Cylindrostethus regulus Drake and Harris, Ann. Carn. Mus., XIX, 1930, p. 238.

Very elongate, rufo-testaceous, with prominent dark brown to fuscous-black markings. Antennæ largely brownish black, the apex of first and basal portion of second lighter; proportions, 125:45:34:55. Sides of abdomen and lateral margins of pronotum with broad, fuscous-black stripes. Abdomen above brownish black, usually with a rather distinct brownish, median line. Connexiva broad, brown, terminating in short sharp spines. Rostrum short, scarcely reaching to the prosternum, the last two segments black. Anterior femora darker on inferior surface, there with numerous short bristly hairs; tibiæ

dark brown, broadened at apex; second tarsal segment twice as long as first. Intermediate and posterior legs very long and slender; femora extending beyond tip of last genital segment.

♂. Sixth venter depressed behind, very broadly and roundly excavated, and with numerous short hairs along the hind margin. First genital segment large, plump, cylindrical, with numerous short hairs along the sides and apical margin; last segment terminating above in a very long, sharp spine (Pl. XXV, fig. g).

♀. Venter with a faint median longitudinal ridge, last segment slightly sinuate behind. Last genital segment also terminating in a long spine. Connexiva strongly reflexed, each ending in a sharp, short spine.

Size: Length, 18.50-20.00 mm.; width, 2.10 mm.

Nova Olinda, Rio Purús, Brazil, collected by S. M. Klages, June, 1922, Carnegie Museum. Mr. W. E. China kindly furnished the writers with notes and drawings of White's type (female) in the Perth Museum, London.

Genus POTAMOBATES Champion, 1898

Logotype, *unidentatus* Champion

Potamobates Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 154; Kirkaldy, Trans. Amer. Ent. Soc., XXXII, 1906, p. 155; Kirkaldy and Torre-Bueno, Proc. Ent. Soc. Wash., X, 1908, p. 211.

Eyes oblique, not strongly exerted, coarsely faceted, feebly emarginate within posteriorly, rather narrowly separated anteriorly. Rostrum short, reaching to the mesosternum. Head subtriangular, produced and declivous in front. Anterior legs short, the femora stout and incassate towards base; tarsi with basal segment short, less than half as long as the second; coxæ widely separated. Middle and hind legs very elongate, the former longer; femora of hind legs longer and slenderer than intermediate ones; second segment of hind tarsi much shorter than first. Thorax elongate-trapezoidal, widening to the intermediate acetabula; pleura prominent, rounded externally; pronotum short, not produced behind in apterous form, covering the mesonotum in the winged form. Mesonotum flattened and shiny in apterous individuals.

The genital segments are asymmetrical in the male, and also in the female in some species. The left side of the second genital segment is produced postero-laterally into a peculiar plate-like structure in the male in certain species, thus somewhat reminding one of the projections from this segment in *Cylindrostethus*; however, in American species belonging to the latter genus the genital segments are bilaterally symmetrical. Also it should be noted that the metasternum is divided

by a transverse suture a little before its hind margin, the omphalium being placed in this suture as in *Cylindrostethus*. A few workers have erroneously considered the basal part of this division of the metasternum as the first segment of the venter, which in their opinion possesses seven visible segments instead of six. In both *Cylindrostethus* and *Potamobates* the anal opening is closed by a hard, circular, plate-like structure. Champion considered the genus to form a sort of connecting link between the *Gerrinea* and the freshwater halobatine forms.

Six species are known from the tropical regions of the Americas. The writers have not seen examples of *williamsi*, *tridentatus*, *bidentatus*, and *unidentatus*.

KEY TO SPECIES OF *Potamobates*

1. Male..... 2
Female..... 7
2. Genital segments with three prominent tooth-like projections (Pl. XXVI, fig. 1, *c-e*)..... 3
Genital segments without definite tooth-like projections, or with only one or two, often however the second segment with a projecting, somewhat expanded rod-like structure..... 4
3. Genital segments as seen from above distinctly shorter than rest of abdomen; beneath the teeth, and the emargination of apex of last venter, as in Pl. XXVI, fig. 1, *c, d, e*..... *tridentatus* Esaki, p. 228
Genital segments almost as long as rest of abdomen; the hook-like teeth farther separated, and the emargination at apex of last venter much narrower..... *williamsi* Hungerford, p. 228
4. First antennal segment distinctly longer than width of head thru eyes. First genital segment without distinct tooth-like process, second segment with prominent finger-like projection (Pl. XXV, fig. *h*)... *osborni* D. & H., p. 225
Length of first antennal segment not noticeably greater than width of head thru eyes. First genital segment with one or two definite acute teeth... 5
5. Antennal segments II and III subequal. Genital segments with only one tooth..... *unidentatus* Champ., p. 227
Antennal segment III distinctly shorter than II. Genital segments with two teeth..... 6
6. Middle and hind femora much longer than entire body. First genital segment with two teeth (Pl. XXVI, fig. *a*)..... *bidentatus* Champ., p. 227
Length of middle and hind femora only slightly greater than that of entire body. First genital segment with only one tooth; second segment directly beneath it also toothed (Pl. XXVI, fig. *f, g*)..... *horvathi* Esaki, p. 226
7. Connexiva ending in long tapering processes (Pl. XXVI, fig. *b*)..... 8
Connexiva not terminating in long tapering processes (Pl. XXVI, fig. *h*)... 9

- 8. Connexival spines surpassing genital segments by half their length. Last segment of venter deeply angularly incised along apical margin, the incision cutting about half the length of the segment. *williamsi* Hungerford, p. 228
 Connexival spines shorter. Last venter almost truncate at apex (Pl. XXVI, fig. b) *tridentatus* Esaki, p. 228
- 9. First antennal segment distinctly longer than width of head thru eyes. First genital segment above produced into a very long, tapering process, about as long as the 4 preceding segments together (Pl. XXV, fig. h)
osborni D. & H., p. 225
 First antennal segment not noticeably longer than width of head thru eyes.
 First genital segment not greatly produced distally 10
- 10. Antennal segments II and III subequal *unidentatus* Champ., p. 227
 Antennal segment II distinctly longer than III *horvathi* Esaki, p. 226

1. **Potamobates osborni** Drake and Harris (Pl XXV, fig. h)

Potamobates osborni Drake and Harris, Proc. Biol. Soc. Wash., 41, 1928, p. 25.

Broad, elongate; black, a broad stripe between the eyes, a narrow median stripe on the pronotum and body beneath ochraceous. Mesosternum with a rather large black spot on each side behind the middle; the pleura with a silvery pubescent stripe. Antennæ blackish; formula, 108:43:28:36. Intermediate and posterior legs very long, their femora as long as entire body.

♂. Connexiva moderately broad, scarcely produced behind. Last segment of abdomen nearly as long as the two preceding segments. Venter sulcate along middle, the sixth segment nearly as long as the two preceding ones; deeply, broadly, and roundly excavated behind in the middle, the margin hairy. Genital segments as long as rest of abdomen; first segment above convex, widest beyond the middle, subtruncate behind, beneath strongly concave, produced farthest posteriorly on the left side, the margin there thickened and without tooth-like projection. Second genital segment above much shorter and narrower than first, gradually narrowed posteriorly, the apex triangular; left side extending downward more than the right, its base with a flattened finger-like process, which projects postero-laterally. This process is slightly expanded at apex and arises from beneath the thickened margin of the first segment (Pl. XXV, fig. h).

♀. Connexivum narrowed posteriorly, the margin almost straight, the apex truncate. Last abdominal tergite almost as long as the two preceding. Fifth venter with a V-shaped notch in the middle of hind margin; the sixth truncate at apex, almost as long as the two preceding segments. First genital segment above black, convex, strongly narrowed posteriorly on basal portion, thence prolonged into an extremely long, gradually tapering, somewhat sinuous, rod-like structure; the entire segment about as long as the preceding four or five segments of abdomen. First genital segment beneath broad, flattened,

subrectangular, forming a flap-like structure, the hind margin arcuately rounded. Second genital segment sub-conical, suspended beneath the enlarged basal portion of the first, convex and blackish above, considerably shorter than the rod-like process of first, the anal cap located near the tip.

Size: Length, 12.70 mm.; width, 3.60 mm.

Known only from the type series, Montzorango, Vera Cruz, Mexico; collection of Iowa State College. The antennæ and the genital segments of male and female readily serve to identify this species. The winged form is unknown.

2. *Potamobates horvathi* Esaki (Pl. XXVI, figs. *f* - *h*)

Potamobates horvathi Esaki, Ann. Mus. Nat. Hung., XXIII, 1926, p. 254, fig. 2; Drake and Harris, Proc. Biol. Soc. Wash., 41, 1928, p. 26.

Black and somewhat shiny above, pale brown to ochraceous beneath. Head brownish, with variable black markings, sometimes almost entirely black. Antennæ black; proportions—(♂) 72:41:22:42, (♀) 66:32:21:40. Thorax and abdomen above black, a broad longitudinal stripe on the pronotum, a long stripe on disc of mesonotum, the upper basal three-fourths of anterior femora, anterior and posterior trochanters and intermediate coxæ ochraceous. A broad stripe on sides of mesopleura, hind angles of mesonotum, and the intermediate and posterior acetabula above with silvery pubescence. Intermediate and posterior legs long, their femora about as long as body.

♂. Connexiva rather broad, the lateral margins slightly rounded, truncate at apex. Last abdominal tergite about as long as the two preceding. Venter with sixth segment impressed, nearly as long as the three preceding, the apex broadly roundly excavated. Genital segments above black, the first segment long, gradually narrowed posteriorly; beneath sub-cylindrical, ochraceous, the apical margin oblique, produced on left side into a tooth. Second segment above narrower than first, rounded behind, its left side extending downward farther than right side and at base produced into a sharp, flattened, triangular thumb-like tooth that projects from directly beneath the apical tooth of first genital. Second genital segment on left side with a posteriorly projecting tooth (Pl. XXVI, figs. *f* and *g*).

♀. Connexiva much broader than in male, very strongly reflexed and lying largely on surface of abdomen, not produced behind, the fourth, fifth, and sixth segments wider and more deeply scalloped. First genital segment above broad at base, about twice as long as broad, somewhat triangular in outline, its apex overlapping basal portion of second segment; the latter also black, rounded behind. Sixth venter about as long as the two preceding segments. First genital projecting behind in the form of a broad, obtusely-pointed plate-like structure (Pl. XXVI, fig. *h*).

Size: Length, 7.90-8.20 mm.; width, 2.60 mm.

Known from Colombia, Honduras, and Guatemala. The types from Mamatoca, Colombia, are deposited in the Budapest Museum. In the female the connexiva are a little narrower in winged specimens than in apterous individuals.

3. *Potamobates unidentatus* Champion

Potamobates unidentatus Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 155; Esaki, Ann. Mus. Nat. Hung., XXIII, 1926, p. 251.

Head shiny, with a posteriorly widened median vitta between eyes, and the sides in front ochraceous. Antennal segment I nearly or quite as long as II to IV united, II and III subequal, each shorter than IV.

Apterous form: Pronotum short, transverse. Mesonotum flattened, shiny, a median vitta, a small triangular spot on each side of it, and sometimes a line extending from the spots downwards ochraceous.

Winged form: Hemelytra extending considerably beyond the tip of abdomen, the wings about one-third shorter. Pronotum with a triangular patch at the base of anterior lobe, the sides and hind margin of posterior lobe, an elongate mark on the metanotum, connexival margins, coxæ and the trochanters and body beneath flavous or ochraceous.

♂. Sixth venter transversely depressed beyond the middle, the hind margin deeply arcuate-emarginate and ciliate. First genital segment beneath obliquely sulcate, its apical margin produced into a prominent tooth on the left side. Second genital segment broadly and angularly dilated on the right side near the base. Sixth connexival segment slightly produced at the outer apical angle, obtuse at the apex.

♀. Sixth connexival segment more pointed at outer apical angle than in male.

Size: Length, 8.00-10.00 mm.; width, 2.25-2.75. mm.

Types from Panama, British Museum. Also recorded from Mamatoca, Colombia, by Esaki. As the writers have not seen examples of this species, the above notes are based upon the original description.

4. *Potamobates bidentatus* Champ. (Pl. XXVI, fig. a)

Potamobates bidentatus Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 155, pl. IX, figs. 22 and 22a.

Apterous form: ♂. Broad, elongate; black, with ochraceous and silvery pubescent markings. Antennæ with segment I nearly as long as II to IV conjoined, II and IV subequal in length, III considerably shorter. Pronotum short, transverse, depressed on disc, with a narrow median ochraceous line. Mesonotum about two and a half times as long as the pronotum, finely canaliculate down the middle

behind, the channel continued on the metanotum. Sixth connexival segment rounded at the outer apical angle. Last venter transversely depressed beyond the middle, broadly arcuate-emarginate and ciliate behind. First genital segment above as long as the three preceding segments united, the lower apical margin produced on the left side into two prominent somewhat widely separated teeth. Second genital segment with a long projecting process which is visible between the two teeth of the preceding segment (Pl. XXVI, fig. *a*).

Size: Length, 11.00 mm.; width, 3.10 mm.

Known only from the type, male, Mexico; Mus. Holm.

5. *Potamobates tridentatus* Esaki (Pl. XXVI, fig. *b-e*)

Potamobates tridentatus Esaki, Ann. Mus. Nat. Hung., XXIII, 1926, p. 251, fig. 1.

Apterous form: Body black, more or less shining above, pale brown beneath. Head black, with a conspicuous triangular or anteriorly bifurcated spot on vertex. Antennæ rather short, black; segment I slightly shorter than remaining ones taken together, II and III nearly equal in length, IV about one and a half times as long as III. Pronotum short, transverse, black, with a large triangular spot at the middle pale brown; sometimes produced back over mesonotum. Mesonotum very long and broad, somewhat convex.

♂. Genital segments conspicuous, first segment somewhat tube-like from above, remarkably asymmetrical beneath, posterior margin obliquely cut from left to right, with two large teeth on right side behind; second segment with a long acute tooth projecting anteriorly from near the base (Pl. XXVI, fig. *c-e*).

♀. Connexiva strongly produced at their apices. Fifth segment of venter deeply, angularly emarginate behind. Genital segments very small, asymmetrical (Pl. XXVI, fig. *b*).

Size: Length, 8.50-11.00 mm.

Known only from Costa Rica. Types in Stockholm Museum. The above description and the figures are based upon Esaki's publication.

6. *Potamobates williamsi* Hungerford

Potamobates williamsi Hungerford, Bull. Brook. Ent. Soc., XXVII, 1932, p. 228.

Black above, marked with brownish spots and silvery patches; venter pale. Head light brown above. Antennæ largely dark brown, proportions, 10:3.2:3.6:4.7.* Pronotum black, with a large pale brown spot in the middle and silvery patches on the anterior half at the sides; transverse, its length slightly less than that of head. Meso-

*The measurements here given are those of Dr. Hungerford, and were made with a scale different from that used in other descriptions in this paper. The writers have not examined specimens of this species.

notum bordered laterally with silvery pubescent bands and marked above by three variable, pale brown figures; slightly more than three times as long as pronotum, with a faint, median depressed line. Connexiva black, usually with pale spots on last segment beneath.

♂. Last segment of abdomen above a little longer than the two preceding ones. Connexiva triangularly produced behind. First genital segment above as long as the last four abdominal segments; in general shape much like that of *P. tridentatus* Esaki, but with the marginal teeth relatively larger and farther apart and the ventral margin with a much narrower concavity. Second genital segment with the hook-like tooth arising to the right of the median line and terminating between the other two teeth.

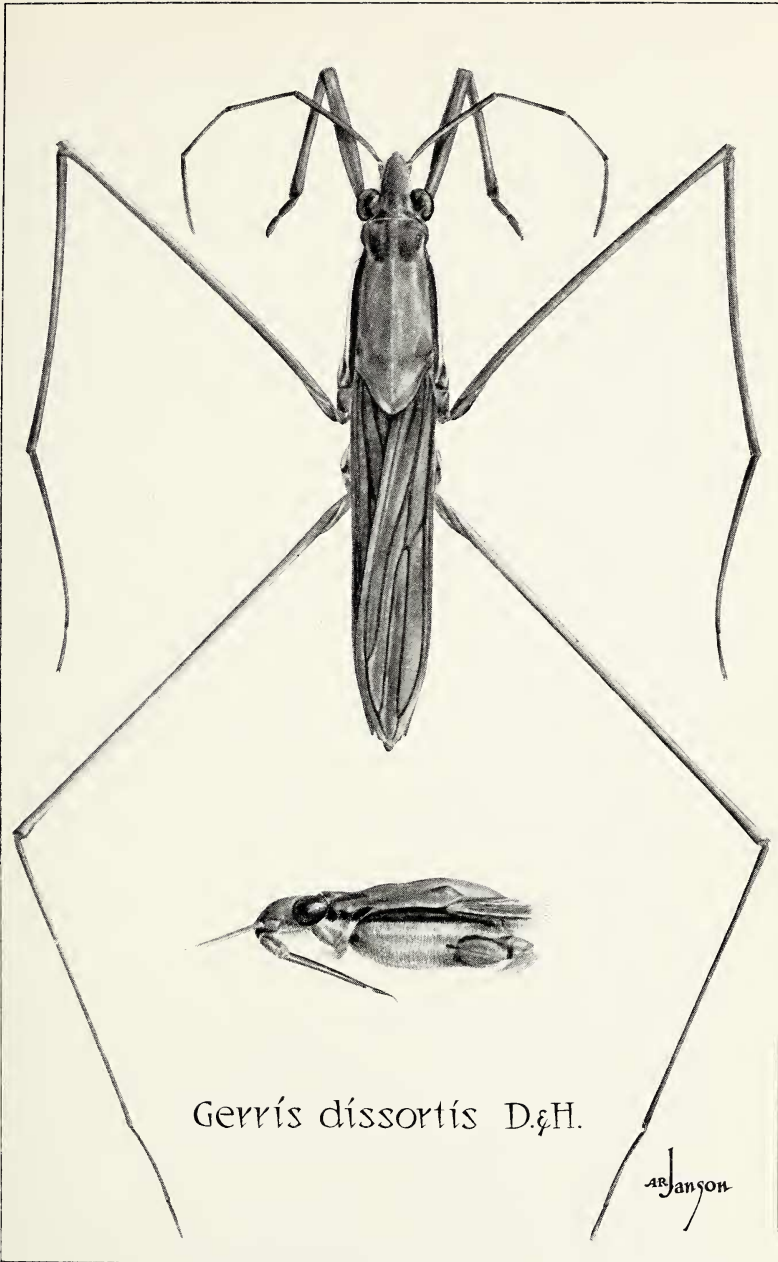
♀. Shorter and plumper than male. Connexiva overlapping lateral margins of last tergite and produced into long, finger-like, somewhat incurved processes that surpass the genital segments by nearly half their length. Genital segments much as in *tridentatus*. The V-shaped incision of the posterior margin of the last venter cutting about half the length of that segment.

Size: 9.00-11.90 mm.

Types from Tena and Mera, Ecuador, University of Kansas. The above notes are taken from the original description.

PLATE XXI

Gerris dissortis Drake and Harris, dorsal and lateral aspect.



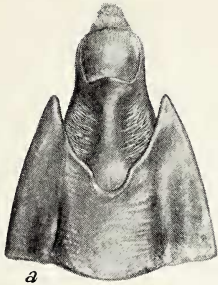
Gerris dissortis D.&H.

AR Janson

For explanation see opposite page.

PLATE XXII

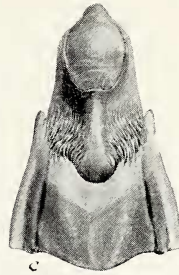
- a. *Gerris incognitus* D. & H., ♂.
- b. *G. insperatus* D. & H., ♂.
- c. *G. comatus* D. & H., ♂.
- d. *G. comatus* D. & H., ♀.
- e. *G. buenoi* Kirk., ♂.
- f. *G. marginatus* Say, ♂.
- g. *G. gillettei* L. & S., ♀.
- h. *G. gillettei* L. & S., ♂.
- i. *G. pingreensis* D. & H., ♂.
- j. *G. incurvatus* D. & H., ♂.
- k. *G. argenticollis* Parsh., ♂.
- l. *G. alacris* Hussey, ♂.



a
inco γ nitus



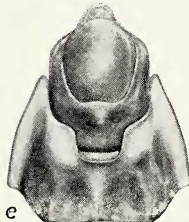
b
insperatus



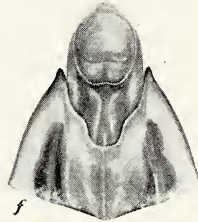
c
comatus



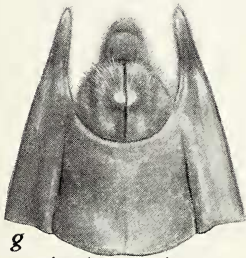
d
comatus ♀



e
buenoi



f
marginatus



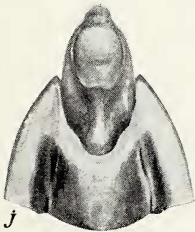
g
Gillettei ♀



h
Gillettei



i
pingreensis



j
incurvatus



k
argenticollis



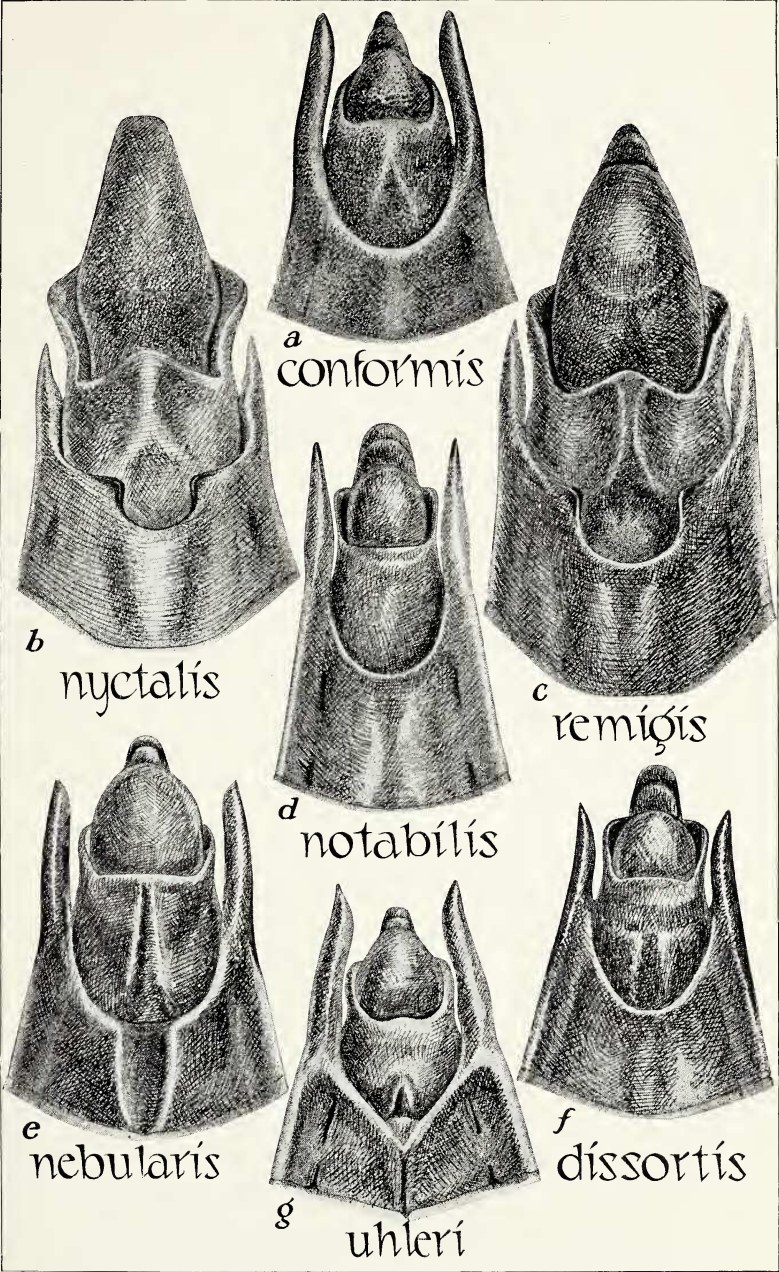
l
alacris

A.R. Janson

For explanation see opposite page.

PLATE XXIII

- a. *G. conformis* Uhl., ♂.
- b. *G. nyctalis* D. & H., ♂.
- c. *G. remigis* Say, ♂.
- d. *G. notabilis* D. & H., ♂.
- e. *G. nebularis* D. & H., ♂.
- f. *G. dissortis* D. & H., ♂.
- g. *G. uhleri* D. & H., ♂.



For explanation see opposite page.

